"A Study of Interaction Effects Between Intelligence and Programmed and Expository Styles of Teaching in Distance Learning"

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CERTIFICATE

This is to certify that the project entitled 'A Study of Interaction Effects Between Intelligence and Programmed and Expository Styles of Teaching in Distance Learning', has been completed by Miss Sunita Kalra, Roll No. 88-MED-11, under my supervision.

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TO

MY PARENTS

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Chapter I

INTRODUCTION

Importance of the study

Education is important for success in modern society. Education is fundamental to our all-round development -- material and spiritual. In the history of mankind, education has formed a continuum and a basis for the development of human society. Through the development of attributes, values and capabilities, both of knowledge and skills, education provides strength and resilience to people to respond to changing situations and enables them to contribute to societal development.

History has established beyond doubt the crucial role played by human resources in the development of nation and the development of human resources is the main function of education. According to John Dewey, "Education must be considered not only as a preparation for maturity but as a continuous growth of mind and continual illumination of life."

Education refines our sensitivities and perception that contribute to national cohesion, a scientific temper and

independence of mind and spirit, thus furthering the process of national development along democratic lines. Thus the prosperity of a nation depends upon its education system and percentage of literacy. A majority of people must be literate for the progress and development of a nation.

Our government has devoted a pointed attention to the objectives of achieving universal literacy through the mass movement. The crucial role of universalization of elementary education and removal of adult illiteracy for strengthening the fabric of democracy have been accepted as imperative goals, to be achieved.

There is no denying the fact that India has made considerable progress since independence in the field of education. During the last years, the number of institutions has increased about three fold. There has been an over-all increase in the enrolment at all levels of education.

TABLE I : Enrolment at Middle and Secondary Level

	1950-51	1982-83
Total students	2.8 crores (Growth rate 4.5 % per annum)	11.4 crores
Middle level	0.31 crores (Growth rate 6.4 % per annum)	2.22 crores
Secondary level	12.2 lakhs (Growth rate 7.8 % per annum)	94.9 lakhs

Source: Challenge of Education, Ministry of Education, New Delhi, 1985.

The above data clearly shows that the enrolment has increased by about four times in a span of 32 years.

TABLE-II : Percentage of Literacy in India.

Year	Total population (millions)	Male (%)	Female (%)	Total (%)
1951	361	24.95	7.93	16.67
1961	439	34.44	12.95	24.02
1971	548	39.45	18.69	29.45
1981	685	46.89	24.82	36.23
1985	739*	55.00*	30.00*	38.00*

* Estimated

Source : Handbook of Educational and Allied Statistics, Ministry of Human Resource Development, Government of India, 1987.

Table II presents the percentage of literacy for male and female population in India. It is clear from the above table that the percentage literacy was 29.95 for male and 7.93 for female in the year 1951. It has increased to 55.0 for male and 30.0 for female in the year 1985. Although the increase is considerable, it is not upto mark. Still a large population of the country is illiterate.

The main reason of this problem seems to be the high rate of population growth in our country. The above table also shows that the total population of India was 361 million in 1951. It increased to 739 million in 1985, an increase of more than 100 % during a span of 34 years. Thus the efforts

made to increase the percentage of literacy have been neutralized by the rapid increase in population.

The problem of drop-out also influences the percentage of literacy adversely. The students enrolled in the schools at class I, do not continue their education. It has been estimated that out of every 100 students enrolled at class I, 60 drop-out before they pass class V and out of rest 40, only 23 reach class VIII (Challenge of Education, 1985). These drop-outs add to the mass of illiterates in the country. Exclusion of such a large number of persons from the education system is bound to influence our national development adversely.

The present trend in the growth of population reveals that the increase has been 24.8 % per decade for the last 20 years. If there is no change in the rate of growth of population and the rate of spread of literacy, there would be 500 million illiterates in the year 2000 A.D. According to World Bank in that year 54% of the world's illiterate population in the age group 15-19 would be in India.

The above discussion indicates that our present formal system of education is not sufficient to achieve the goals of universalization of education. Some other alternative has to be searched which could be helpful for achieving the goal of universalization of elementary education and to cover as much as possible the non-enrolled and dropouts and education of adults particularly in the productive age of 15-36 years.

The National Policy on Education (1986) has laid stress on non-formal education and distance education as alternatives to the formal education system. Before that the Indian Education Commission (1964-66) also pointed out that, "There is urgent need for developing an alternative system of education to the millions who are residing in the different corners of the country and whom we have not been able to reach through formal education system." Open University of U.K. is one such radical alternative to conventional universities.

Distance education can help us to take education within the easy reach of millions of people who have not been fortunate enough to receive education through formal system of education. The establishment of Indira Gandhi National Open University in 1985 is an effective step in this direction.

The concept of distance education has emerged as a result of man's search for an education which could be provided to a person at home. Instead of bringing students to the schools, it was proposed to take school to the students and hence this concept of distance education came into existence. According to Prof. Borje Holmberg, "Distance education is the various forms of study at all levels which are not under the continuous immediate supervision of tutors present with their students in lecture rooms or on the same premises, but which nevertheless, benefit from the planning, guidance and tuition of a tutorial organisation." Though different names have

been ascribed to distance learning, for example, Sims likes the name 'Correspondence Education', Holmberg likes the term 'Distance Education' Moore believes in 'Distance teaching', and Independent or Home Study is popular and in common use in the United States. In all the cases, it is a process of independent study in which the learner is at a distance from the teacher or teaching organisation

Distance Education and Instructional System

Apart from the multidimensional nature of its courses, the uniqueness of the distance education lies in the fact that its learning programmes are based on interdisciplinary approach and multimedia technique. The methods of instruction comprise correspondence courses, radio instructions, T.V. viewing, use of taped education material, discussions and teacher-student contact programmes.

The choice regarding the use of media for distance education has become more difficult to make. Educational technology provides a perspective to tackle the problems concerning distance education. It offers the means to reach the large numbers of remote and inaccessible areas, remove disparity in educational facilities available to the disadvantaged and promote individualized instruction to learners. What is more important than the choice of media is the effective communication between teacher and learner.

The whole system of distance education depends upon the quality of teaching programmes and the way in which these are carried out.

Distance Education vs. Correspondence Education

The media aid is not sufficiently available in India for purposes of imparting instructions to those undertaking study through correspondence courses. Radio and T.V. lessons are few and far between and all students do not get the benefit of these. It has to be realized that no subject or course can be adequately dealt within a single lesson or some units of lessons. The course material in the form of printed lessons does provide reliable help to distant learner and gives him an opportunity for skill development.

According to a survey, printed material and contact programmes occupy a major role in distance teaching in our country. The printed book is most innovative storage and retrieval information system. It also suits to the economic conditions of country. Printed material is easy to produce, duplicate, transport and use, so it is the most popular media for distance education. The printed media is not only popular in India, but it is also used effectively in many developed and developing countries (Chib, 1977). The printed lessons are the main medium of instruction for correspondence education in U.K. (Basu et al., 1969).

Because there is no direct contact between teacher and learner, there may be lack of motivation. A good correspondence lesson must compensate for at least a part of good teacher's activity. It must adopt styles which besides motivating the distant learner, could also fit into the knowledge structure of many heterogenous students. Since the distance learner has to depend upon the course material provided to him, the lessons should be complete and comprehensive, without being cluttered with unnecessary skills. It must be self-sufficient and involve the principles of effective learning.

Correspondence Education better than formal education

It is believed that correspondence education is inferior and meant for second rate students. The reality however is different and may be even a bit shocking. A study by Bahuguna (1988) has shown that on the same curriculum and in the same examination students appearing in B.A. final examination through correspondence education did better than the students of formal colleges of Delhi University. Superior performance through distance education is not only evident in the overall high pass percentage, it is also revealed when a micro-analysis of the results was conducted. Table III presents the results of this micro-analysis.

The table indicates that not only the over all pass percentage through correspondence education was high, the

TABLE III : Comparison of Results of Correspondence Education and Formal Education.

Year	Total Pass (%)		First Div.		Second Div.	
	FE	CF	FE	CE	FE	CE
1983	39.70	48.19	0.21	0.72	4.37	6.52
1984	32.31	35.06	0.07	0.24	3.38	2.18
1985	9.85	39.86	0.11	0.00	2.90	4.98

percentage of students who passed in first and second divisions is higher for the students studying through correspondence education than through the formal system in Delhi Colleges. The efficiency of correspondence education has also been revealed through the analysis of degree examination results of the universities of Meerut and Kurukshetra. Bahuguna also found that the students in correspondence courses belonged to far off places and possessed lower academic motivation as compared to those in the formal system of education. The quality of correspondence education should therefore be improved so that the students are motivated to learn through this system and develop a positive attitude towards this form of education. It has been pointed out that printed text is main medium of instruction in distance education. Therefore, efforts should be made to improve the quality of lesson employed in this system of education.

In ideal formal classroom situation, the teacher is available for immediate reinforcement and feedback. The main

draw back of a correspondence lesson is that such a facility is not available. If a procedure is developed which incorporates these facilities in a correspondence lesson, the distance education system is likely to be more effective. If such arrangements are inbuilt in distance education lessons, this system, perhaps, would be more effective than the formal system at least on two counts. Firstly, in a formal classroom situation the possibilities of individualization of instruction are very rare. The student has to study at the pace at which teacher is proceeding and has to study the material whether he wishes to study it or not at that moment of time. In the distance learning situation, given a lesson with inbuilt measures for reinforcement and feedback, the student will be able to study at his own pace and in accordance with his interest. Secondly, in a formal classroom situation some of introverted students do not interact with the teacher and get advantage of face to face teaching. Such students are likely to profit more with improved correspondence lessons, because they would interact with the text, which is likely to result in better learning.

Various measures have been suggested to increase the efficacy of distance education lesson texts . Some correspondence lesson texts provide an overview of the lesson before the detailed lesson. This overview helps the students to link the new material in the text with the material in the overview which act as advanced organizers. Some texts

incorporate study questions which help to create motivation in the learner and a sense of satisfaction after the question has been answered and thus act as reinforcers. These texts also provide exercises at the end of the lesson which are required to be answered and mailed to the concern institution, where they are evaluated and returned back. This helps to provide feed-back to the students.

Linear programmes based on B.F.Skinner's theory of operant conditioning seem promising for distance education lesson text, because they gradually increase in difficulty level and include questions of blank spaces which are to be answered/filled in by the student. They have inbuilt arrangement, for example prompts for ensuring correct responses by the learner. This ensures reinforcement which is highly motivating for efficient learning. The learner interacts overtly with the textual material which sustains interest in it. It is therefore, very likely that a distance education lesson designed on the principles of linear programming would be an effective lesson text.

Short (1968), Basu (1969), Kulkarni and Mullick (1968), Saeed (1988) etc. conducted studies to investigate the effectiveness of programmed text for distance learning situations and found that the achievement of the students who studied through programmed text was higher than those of who studied through conventional expository text in distance learning situation.

Therefore, it is proposed that the efficacy of some lesson texts including a linear programme be investigated for distance learning.

Studies investigating the efficiency of different teaching styles including programmed material for different types of learners have shown that an interaction exists between the teaching style and personological characteristics of learner. For example, it was found that low anxiety students achieved higher when taught through programmed instruction than through expository lesson texts. (Kapadia, 1972; Papey and others, 1975). It was also found that introverts are more profited through programmed instruction as compared to conventional teaching method (Davis and Leith, 1967; Leith and Wisdom, 1969). Kumar (1980) found that low intelligence students achieve through a linear programme as high as the high intelligence students do through branching programms. Therefore, it was considered that interaction between different distance education texts and learner's personalogical characteristics be also investigated.

Quite a few lesson texts may be studied for their efficacy in distance learning situations. Similarly a variety of learner's personological characteristics may be employed for their interaction effect. It was not possible in the present situation to take up a study of all leason texts and many personalogical variables, Therefore, it was decided that

the present study may investigate the effectiveness of linear programmed and expository texts for distance learning situation. The interaction between these lesson styles and intelligence of the learners was also proposed to be investigated.

Objectives of the Study

In specific terms the present study seeks to answer the following questions:

(1) What is the relative effectivness of linear programmed and expository lesson texts for distance learning situations?

(2) What is the interaction between linear programmed and expository lesson texts and learner's intelligence?

Hypotheses

The following hypotheses were formulated after the critical evaluation of the previous research in the area and theoretical considerations:

(1) Linear programmed lesson text involves overt interaction, reinforcement and feed-back, therefore,,it is considered that it is likely to prove more effective than the expository lesson text in distance learning situations.

(2) The previous researches have shown that the students of comparatively lower intelligence profit more from linear programmes. It is therefore, likely that in distance learning situations linear programmed lesson texts would yield better results with students of lower intelligence than those of higher intelligence.

(3) The students of comparatively higher intelligence are likely to achieve better through expository lesson text than their lesser endowed counterparts.

Procedure in outline

Three groups of students of class VI (N = 125) were identified. They were matched on the basis of previous achievement. Previous achievement was considered to be a better criterion for matching than intelligence because it encompasses the intellectual as well as the personality variables required for academic success. A pre-test was administered to see if the students possessed all the entry level behaviour, necessary for the success in the instructional programmes.

The subject matter selected for instructional treatments was "the use of articles", A linear programme on this topic prepared by C.Bhattacharya, Reader in English, Regional College of Education, Ajmer, was employed. An expository text with same examples and exercises was prepared by the investigator. One experimental group received instruction through linear programmed text and another experimental group through expository text under distance learning situations.

The third group (control group) was taught the same subject matter under conventional classroom situations. Mehta's General Intelligence Test was administered to these three groups. A post-test was also administered after the instructional treatment.

Analysis of covariance was employed to study the relationship between the instructional treatment and post-test scores. Controlling the effects of intelligence, this technique was employed because it yields post-test scores for different instructional treatment adjusted for the effects of control variables, i.e., intelligence.

The students were also divided in high and low intelligence groups. The significance of difference between the post-test means obtained by different groups of students was also acertained to investigate the effectiveness of an instructional programme for students of different intellectual abilities.

Delimitations

In view of the paucity of time and resources the study has been delimited as follows:

(1) A variety of personality and mental ability variables may be employed for studying interaction effects. The present study has employed only intelligence for this purpose as it was considered the most effective variable influencing achievement.

(2) A variety of instructional treatment modes can be employed for studying interaction effects. The present study has employed only linear programming and expository method of teaching for the purpose as these require different mental and personality variables for success through them.

(3) The present study has considered the subject matter, the use of articles to investigate the interaction effect between intelligence and two treatment modes. This area was selected because it was considered suitable for the present study.

(4) A variety of statistical treatments may be employed to study the interaction effects between intelligence and treatment modes. They include computation of coefficient of correlation, partial correlation, analysis of variance and analysis of covariance. The present study has employed analysis of covariance for this purpose, specially because it helps to eliminate statistically the effect of extranious variables which might influence interaction. This technique also allows the comparison of extreme groups on any personality or mental ability variable so that alternative instructional treatment modes may be assigned for optimal achievement.

Chapter II

A REVIEW OF RELATED STUDIES

Distance education is now regarded as an alternative to formal system of education because it is an efficient and economical method of instruction. In distance education there is no face to face contact between teacher and learner. The distant learner has to depend on the lessons sent to him. Printed media is being used most effectively for distance education. Printed material is easy to produce, duplicate, transport and use. It is also economical. The printed media is the chief medium of instruction not only in our country but in many developed countries (Chib, 1977). After a number of surveys conducted in U.K., Basu et al. (1969) concluded that the printed lessons are the main media of instruction for correspondence education in that country.

In distance education, there is no direct contact between teacher and learner, therefore, the lessons employed therein must be self-sufficient and must motivate the learner for self study. A lesson text based on the principles of Skinner's linear programming is likely to be fairly efficient for distance learning situation because it is based on the principles of

efficient learning. Therefore the present study seeks to investigate the effectiveness of linear programmed text for distance learning situation. Basu (1969) also recommends this lesson text for the aforementioned purposes. He writes, "many correspondence colleges are aware of the possibilities of using programmed instruction. The method seems almost made of order, when one considers the principles of correspondence study, certain similarities are evident between the two."

Some of the similarities between the principles of programmed instruction and correspondence study are:

(1) Both methods allow for each learner to proceed at his own rate.

(2) Both methods use materials that can be studied in individual situation.

(3) In both methods, learner activity is required. In programmed instruction, the learner is to respond at each step thus he is actively involved in learning. The exercises and self-checking in correspondence course also require high levels of activity by the student.

(4) In both methods there is little or no pressure to keep up with other students or to complete the study of a unit within a certain number of periods.

(5) Both are highly structured methods of teaching. In developing the material for these methods the writer of a programme or of course has definite learning outcomes as objectives and the procedure that the student is to follow is specified quite explicitely.

(6) In both, there is little opportunity for degression for the person studying.

(7) In both methods, the students responses are confirmed and knowledge of results is provided. In a typical programme, the student receives this knowledge of whether his response is right or wrong immediately after making the response. Many correspondence courses contain self-checking tests which also provide the student with immediate knowledge of results. These similarities between the principles of two methods, correspondence education and programmed instruction have also been supported by Basu (1969).

The programme instruction has other advantages of immediate reinforcement and feedback thus provides motivation to the learner. By making suitable modifications in the size and nature of frames, programme instruction can be effectively used for distance learning. The report of the conference of new media in correspondence study, University of Texas, 1962, recommended that "the programmed learning concepts are admirably suited to meet some of the fundamental problems of correspondence study and will ultimately make a significant contribution to correspondence teaching." But it also cautioned that programmed learning must be used when an analysis of the teaching programme reveales that the programmed learning method will make the most efficient and effective contribution to teaching.

A series of surveys has been conducted to find out the extent of the use of programmed instructions in correspondence

courses. A survey of commercial colleges which are members of either the Association of British Correspondence College or the Cleaver-Hume group reveals surprisingly that none is currently using programmed instruction in its courses. The Cleaver-Hume group has however, actively considered the probability of using programmed instruction. Two colleges had tried programmed instruction on a limited scale and abondoned it. Their objections to the method were the bulkiness of programmed materials which increased printing, storage and postage costs, the cost of developing programmes both in time as well as money and a belief that programmed materials lack variety with the risk of boredom if the method were used throughout long courses.

A survey conducted by American Correspondence colleges shows a little more activity, but still only one-fifth of the schools replying to the enquiry were using programmed instruction. of the twenty-three colleges that were using programmed instruction, Over half had prepared their own programmes. Though there were criticisms of the method, similar to those mentioned above, the American colleges do report better completion rates and faster student progress or better student achievement when they used programmed instruction materials.

In addition to the survey of correspondence colleges, further survey were made of university departments of education and psychology, colleges of education, technical colleges, professional bodies and some of the larger industrial and

commercial organisations known to have an interest in programmed instruction. Only one example of the use of programmed instruction on correspondence courses were found, that was at the College of Estate Management (Davidson and Swann, 1968).

A perusal of the surveys mentioned above reveals that the programmed instruction text has been used in American institutions and results have been fairly encouraging. They report better school achievement and faster student progress through lessons based on linear programmes. The surveys conducted in U.K. shows that the lessons based on this technique have not been employed because of the high cost of developing lessons based on Skinner's techniques. The cost involved should not be a deterrent in the use of this text if it is found to be more effective than others because once a lesson has been developed its millions of duplicates can be obtained and used thus reducing the per capita cost to a very low level. The other objection to its use is the bulkyness of lessons employing linear programming technique consequently making them unsuitable for storage and transportation while cost should not be limiting factor vis-a-vis its efficiency, yet the bulkyness can be reduced considerably by using programmes with large sized frames as suggested by Markle (1964).

Some researches have also been conducted to investigate the efficiency of programmed lesson texts for distance learning

situations. Such researches are few and far between because of the recent interest evinced by the researchers in the field. A comparative study of the use of programmed material in correspondence and class room situations by Basu, Cavanagh and Jones (1968) revealed that programmed instruction when given through correspondence could be as effective as when it is given in a normal class room situation. It is particularly so when the students are motivated and fairly mature.

Davidson and Swann (1969) administered a linear cum branching programme on 'principles of valuations' to 54 internal students who read the programme in class room situation, completed the post-test and returned it to the teacher. It was also administered to 90 students who read the programme under distance situations and returned the post-test scripts. An attitude questionnaire was also administered to the two groups. It was found that both groups favoured the programmed instruction. The distance learning group achieved higher as compared to class-room teaching situation.

Short (1968) using the conventional and programmed version of a correspondence course in a class-room situation with United States Navy personnel, found that students taking the programmed course tended to achieve more than students taking the conventional course. Using the same materials in a correspondence situation no difference in achievement appeared between two groups.

In India, studies aimed at investigating the effectiveness of programmed text for distance learning are few. Mullick, (1964) studied the effectiveness of programmed learning technique in a correspondence course situation. The sample consisting of 128 B.Ed. students of correspondence course of Delhi University was divided into experimental and control groups. The experimental group studied the material based on programmed style and the control group studied the material on conventional style. A post test was administered to the two groups to study the effectiveness of the two instructional styles. An attitude inventory was also administered to the both groups. The results showed the effectivenss of programmed style and a positive attitude of the students to this style of lesson text.

Saeed (1988) conducted a study on the effectiveness of branching programme for distance learning. In this study the exprrimental group received instruction through branching style of programme on digit sum method of testing arithmetic computations under distance learning situations. The control group was taught the same content through conventional style in class room situation. A post-test was administered to the two groups. The comparison of the post-test scores made by t-test showed that there was no significant difference between the achievement of two groups.

It is well recognised that achievement is a function of

both learner's characteristics and treatment modes. Many personality and mental ability variables affect the achievement. In recent years quite a few studies have been conducted to investigate the interaction between different personality and mental ability variables and instructional modes. These investigations have been called as studies of Aptitude Treatment Interaction ATI (Tobias, 1976), or Trait-treatment Interaction (TTI) (Berliner and Cohen, 1973). Atributes such as intelligence (Keisler and Stern,1970; Kapadia, 1972), creativity or divergent thinking ability (Rechard, Jason and Marwin, 1969; Tabias, 1969), anxiety (Leith, 1969) and introversion/extroversion (Leith and Wisdom, 1970; Greer, 1976) have been studied for the interaction with different treatment modes.

Intelligence seems to be one of the most important variables for the study of Aptitute-Treatment-Interaction. The present investigator has selected only this variable for studying the interaction effects. Since studies investigating the interaction between intelligence and different instructional treatments were not available in distance learning situations, therefore the studies of interaction in conventional classroom situations have been reported. Shah (1964), Desai (1966), Nagar (171) and Kapadia (1972) studied pupil's intelligence in relation to achievement on programmed learning materials. Shah, Desai and Nagar reported that differences in intelligence

did not have an impact on achievement in the post test after going through learning material but Kapadia's study indicated that high intellectual ability did help the pupils to achieve better on programmed learning material.

Bhushan (1973) attempted to study the relationship between different personality and mental ability variables including intelligence and achievement through a linear programme. The analysis revealed that the post-test scores were significantly and positively correlated with intelligence.

Singh (1977) attempted to study the relative effectiveness of three instructional methods -- linear, branching and conventional -- for teaching arithmatic to VIII class students with different levels of intelligence. By computing t-values, she found that branching programme was specially suited for high and medium intelligence groups and the low intelligence groups benefited more by linear programme.

Kumar (1980) also studied the interaction between intelligence and style of instruction in class-room situation. Three matched groups received instruction through linear, branching and expository methods. The analysis of covariance of past-test scores showed that there is significant interaction between intelligence and achievement through linear as well as branching style of programming. The high intelligence students achieved higher as compared to low intelligence students through expository method. The linear programme seemed to be

better for low intelligence students in comparison to branching style. It was also found that high as well as low intelligence students have secured better through linear style of programming as compared to expository method.

This chapter presents a theoritical rationale for the use of Skinner's programming technique for preparing lessons for distance learning situations. Some of the most important characteristic of face to face teaching like immediate feedback, reinforcement are inbuilt in linear programmed text, thus it seems to be tailor-made for distance learning situation. This view has also been supported by Basu et al. (1969) who has discussed the similarities between the characteristics of correspondence lesson and those of a linear programme. Therefore such texts has put to use in distance learning situations with advantage specially in U.S.A. and U.K.

Studies investigating the effectiveness of linear programmed texts and conventional lesson texts in distance learning situations although insufficient in number, primarily because of very recent interest of researchers in the area, have clearly shown that this text has yield better results than the conventional texts.

Evidences of interaction between intelligence and instructional treatment have been found in class-room situations. It may be that such an interaction also exists in distance learning situations. Therefore, researches conducted in

classroom situations dealing with interaction between learner's characteristic and instructional treatment has also been reported. Such studies have shown that the linear programmed lesson texts may be optimally suited to students at particular level of intelligence in distance learning situations.

Chapter III

DESIGN OF THE STUDY

Distance education is an alternative to formal education for those who cannot, for one reason or other take advantage of the formal system of education. It also provides opportunity to those who do not feel adjusted in the class-room situations due to its rigidity and lack of interaction between students and teachers. Distance education promotes individualized learning and free expression of ideas, which is an important aspect of democratic education system.

A distance education course material may be regarded as a private communication between an instructor and one interested pupil. Information is usually conveyed by the written word. Whatever the materials used to convey the information, it must provide actual teaching by itself. The material must embody the equivalent of a text-book, lecture notes, blackboard practice and assessment of the student's progress. A programmed text incorporates all these aspects of learning.

The present study seeks to investigate the relative effectiveness of programmed and expository text for distance learning. Three matched groups of students studying in class VI of a local high school were selected. One of these

groups served as a control group which was taught through conventional teaching in class room situations. The remaining two groups served as experimental groups. One of the experimental groups recieved instruction through linear programmed text under distance learning situations. The other experimental group received instruction through expository text under distance learning situations. An intelligence test was administered to the three groups. A post-test was also administered to the three groups after the instructional treatments. The post-test scores were compared by the help of t-test to study the interaction effect of intelligence and instructional treatment. Analysis of covariance was employed to study the comparative effectiveness of linear programmed and expository texts for distance learning situations.

Criterion of Matching

Variables like intelligence,personality and socio-economic variables, previous achievement etc. influence achievement, therefore, they should be controlled for dependable results. Obviously it was not possible to employ all such variables in a study like present one. It was considered that previous achievement in the subject is not only due to learner's mental ability but is also due to his personality, study habits, achievement motivation,etc. Therefore, it was considered justified that this measure,if

employed as a control variable would perhaps take care of all the variables other than those under study. The previous overall achievement has been employed for this purpose in the present study. Desai (1966), Khushdil (1968), and Patel (1978) have also employed previous achievement as a control variable in their studies. Therefore, the criterion of matching the three groups under study on the basis of previous overall achievement was thought to be most appropriate in the present study.

Control Variable

The review of previous studies has shown that a variety of personological characteristics show significant interaction with instructional treatment, i.e., person high or low on a personological variable achieve differently when different instructional modes are employed. It was found that intelligence is a very important variable which interacts significantly with instructional treatment, specially when the programmed texts are involved. Monroe (1950) while emphasizing the fact, writes: "... It is a truism to say that intelligence is of significance in most school situations." Dhaliwal (1971) is also of the same view. He says, "Intelligence is the single important factor accounting for variation in academic achievement, that it plays a major role in causing difference among individuals regarding their academic achievement." Many investigators like Vidhu (1968), Butcher (1968),

Shrivastava (1969), Jha (1970), Sinha (1970), Bhushan and Sharma (1976), Seth (1978) etc. have obtained significant and positive relationship between intelligence and achievement.

It has been stated in preceeding paragraphs that previous achievement has been employed as a criterion of matching the control and experimental groups. This variable encompasses all other variables concerned with intellect and personality which are likely to influence academic achievement. The present study proposes to investigate the interaction between intelligence and three instructional treatments -- linear programmed text, expository text in distance learning situations and conventional method of teaching in classroom situations.

It was however felt that the effect of intelligence may be neutralized from the post test scores. This could be done by partialing out the effect of intelligence but the resultant figure would be a coefficient of correlation. The investigator felt that if the means of post-test scores adjusted for the effect of intelligence could be obtained, they would serve perhaps better in estimating the relative efficiency of instructional treatment. Therefore, the intelligence test scores were also employed in the analysis of covariance which helped to obtain means of post-test scores adjusted for the control variable.

Instructional Treatment

The review of researches shows that the effectiveness

of a variety of instructional treatments has been investigated for distance learning situation. They include linear programmed text (Basu, 1968), linear-cum-branching (Davidson and Swann, 1969), branching (Saeed, 1988), and expository texts (Mullick, 1964), etc. The present investigation proposes to study the comparative effectiveness of a linear programmed and expository texts for distance learning situation.

(A) Linear Programmed Text - A linear programme presents the subject matter in the small segments known as frames. Each frame provides a small information and a question which is required to be responded by the student on the basis of information provided. There is also a provision for confirmation of the response. If the learner's response is correct, he gets reinforcement. In the early frames of a linear programme, the learner is helped to give the correct response by the help of prompts which are later on gradually withdrawn from the succeeding frames until the learner is able to give the correct response without any aid.

A linear programme of English subject on the topic 'The use of articles' developed by C. Bhattacharya, Reader in English, Regional College of Education, Ajmer, was selected to provide instructions to one experimental group under distance learning situations.

Some frames of the programme are as follows:

	(1) (a) Do you want a book? (b) Take the book on the table. In the first sentence the word 'a book' do not refer to a particular or known book, but in the second sentence the words 'the book' refer to a _____ book, which is on the table.
Ans to 1: Particular	(2) Examine the three sentences:- (a) A wolf came to stream. (b) A lamb also came there. (c) A wolf was stronger than a lamb. The first two sentences are correct. Is the third sentence also correct (YES/NO)
Ans. to 2: No	(3) (a) A wolf and a lamb came to stream. (b) A wolf was stronger than the lamb. In the second sentence we have used 'the' before 'wolf' and 'lamb' because we speak about a particular wolf and a p_____ lamb already mentioned in the first sentence.
Ans. to 3: Particular	(4) We do not use 'the' before any wolf or any lamb. But before a _____ wolf or lamb which has already been mentioned, we use ____.
Ans. to 4: Particular the	

A complete linear programmed text booklet is given in Appendix-A.

(B) Expository text - Expository text involves the presentation of matter in a way that helps understanding and comprehension easily. An expository text of subject matter with

similar content, examples and exercises as in linear programme, was prepared by the investigator herself was given to other experimental group under distance learning situations. The students studied this text themselves without the help of teacher at their homes. The whole sequence was presented in the form of expository text has been presented in the Appendix-B.

The similar content of linear programmed as well as of expository text was taught to control group under conventional class-room situations by the investigator herself. The examples, illustrations and exercises were given similar to those given in linear programmed and expository texts. The students were allowed to put questions freely if they had failed to understand any point.

Achievement Tests

(a) Pre-test - Successful learning through any instructional treatment requires a mastery of some entry level behaviours. If these behaviours are not available in the learner, the instructional treatment would not be effective. The subject matter for three instructional treatments employed in the present study was 'the use of articles' which requires the knowledge of different types of nouns, vowels and consonents and understanding of simple sentences on the part of students. It was therefore ensured before the delievery of instructional

treatments that the students possessed all these entry level behaviours by administering a pre-test to all the three groups under study. The pre-test consisted of supply type short answer items. The results of pre-test showed that students had all the pre-requisite knowledges necessary for successful learning.

It should also be ensured before giving the instructional treatments that students do not possess any knowledge which is proposed for instructional treatment for obvious reasons. The pre-test also helped to find out whether or not the students under investigation possessed the knowledges which was proposed to be taught through the instructional treatments. It was found that they did not already possess such informations.

(b) Post-test - The efficiency of an instructional treatment can be ascertained through the comparison of scores obtained by the students studying through them. Therefore a post-achievement test incorporating all the concepts included in the instructional treatment was administered after instructional treatment. The achievement test was available with the programme. Since the subject-matter was similar in three instructional treatments, the similar post-test was administered to the three groups. The achievement test administered has been included in Appendix-C.

Intelligence Test

Mehta's general intelligence test was administered to the three groups under investigation. This test is meant to measure general intelligence or g-factor of the age 12-14 years. The test consists of 60 items of following types:

(a) Logical selection
(b) Analogies
(c) Best answers
(d) Disarranged sentences
(e) Number series
(f) Classification
(g) Inference
(h) Arithmatical reasoning

The reliability of test studied by product-moment correlation between scores on odd and even items for a random group is .879. The reliability obtained after the application of Spearman-Brown formula is .930. It shows that test is quite reliable for the age group 12-14 years. Therefore it was administered to the three groups under investigation. The examples, given in the test booklet were explained to the students beforehand. They were then required to complete the test. The time limit of the test was fixed at 18 minutes. The scoring was done with the help of scoring stencil. The raw scores of intelligence test obtained were directly manipulated to study the interaction between intelligence and three instructional treatment modes.

Statistical Treatment

A variety of statistical techniques have been employed

for investigating the interaction between learner's characteristics and various treatment modes. They include t-tests, coefficient of correlation, analysis of variance and analysis of covariance. The coeffifient of correlation and analysis of variance may indicate the nature and quantum of relationship between instructional treatment and post-test scores. The previous achievement in the present study was controlled by matching the three groups under study on its basis. The effect of other control variable, i.e., intelligence,cannot be easily controlled by the above technique. Moreover, they do not yield adjusted means of post-test scores obtained by the student studying through different instructional treatments, which may be employed later on to study the relative effectiveness of instructional modes. Therefore, analysis of covariance was employed to study the relationship between post-test scores and instructional treatment, because it not only helps to control a variable but also yields means to post-test scores adjusted on the basis of that variable.

The researches presented in the previous chapter suggest that significant interaction may exist between the instructional treatments and some characteristic of the learner. It was thought that intelligence may be studied for such interaction effects as it is the important variable affecting academic achievement. The study of this interaction

is possible by studying the significance of difference between post-test means obtained by the students of high and low intelligence. The significance of difference of means can be studied by t-values. Therefore, this statistics was also employed in the present study.

Chapter IV

PRESENTATION AND ANALYSIS OF DATA

The present study proposes to investigate the efficiency of programmed instruction lesson text and expository lesson text for distance learning situations. Three groups of students studying in class VI were identified. They were matched on the basis of previous overall achievement. Previous achievement has been employed as the criterion of matching because it encompasses the effects of all the variables which determine the academic achievement. Groups matched on the basis of previous achievement are likely to be similar when the ultimate criterion is achievement through different instructional treatments is concerned. A pre-test was administered to the three groups to see whether or not the students possessed entry level behaviours necessary for the satisfactory completion of instructional treatment and that they do not possess the behaviours which are proposed to be taught. The subject matter selected for the instructional treatments was 'the use of articles'. One of the three groups (control group) was taught through conventional teaching method under class-room situations.by the investigator herself. The second group (experimental group I) received instruction through linear

programmed text under distance learning situations. The third group (experimental group II) received instruction through expository text also under distance learning situations. Mehta's general intelligence test was administered to the three groups to study instructional treatments. A post-test was administered to the three groups after the instructional treatments. The post-test scores were compared with the help of analysis of covariance to study the effectiveness of three instructional treatments. The means of post-test scores of low and high intelligence groups receiving the instruction through three treatments, were compared by t-values to study the interaction effect between intelligence and instructional treatment.

Criterion of Matching - 125 students of class VI studying in a local high school comprised the sample of the study. They were divided into three groups on the basis of their previous over all achievement. The means of scores of previous achievement, standard deviation and t-values for the difference between the means of the previous achievement scores are presented in table IV.

All the t-values are insignificant which shows that three groups are matched on the basis of their previous overall achievement. The distribution of the previous achievement scores of the three groups has been shown in figures 4.1, 4.2 and 4.3, which also indicate that the distribution of these scores is nearly similar.

TABLE IV

Distribution of Previous Achievement Scores of the Three Groups.

Groups	N	Mean	S.D.	t-values
Control	27	58.34	10.92	0.52 (Between Control & Exp. I)
Experimental I (Programmed learning)	30	56.80	11.52	0.69 (Between Control & Exp.II)
Experimental II (Expository learning)	30	56.30	11.16	0.17 (Between Exp. I & Exp. II)

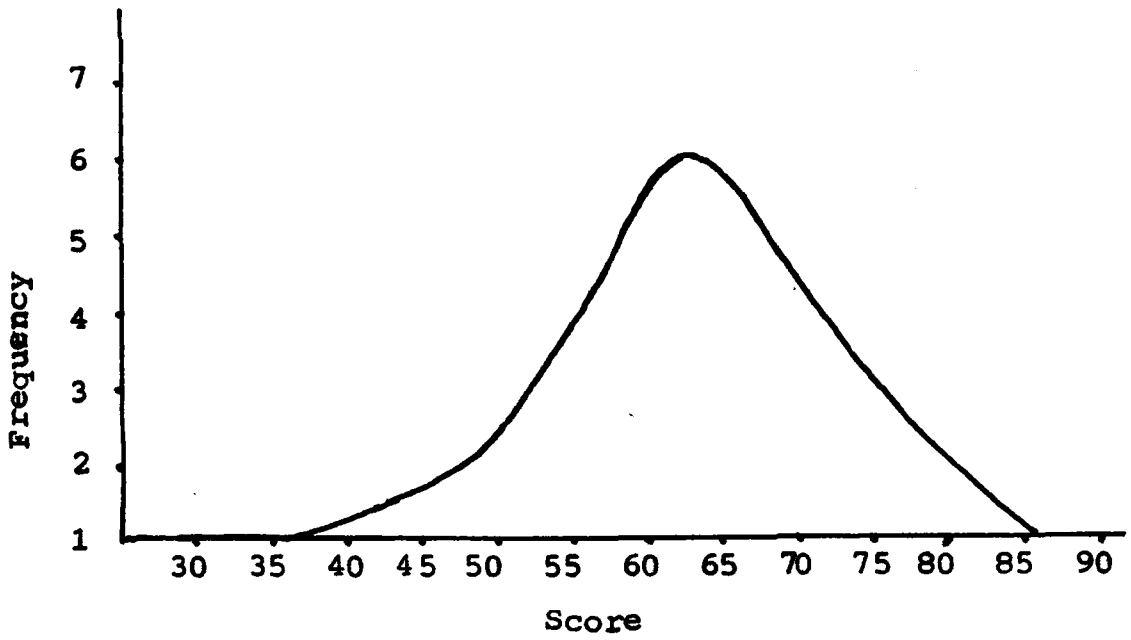


FIG. 4.1 : Distribution of Previous Achievement Scores of Control Group.

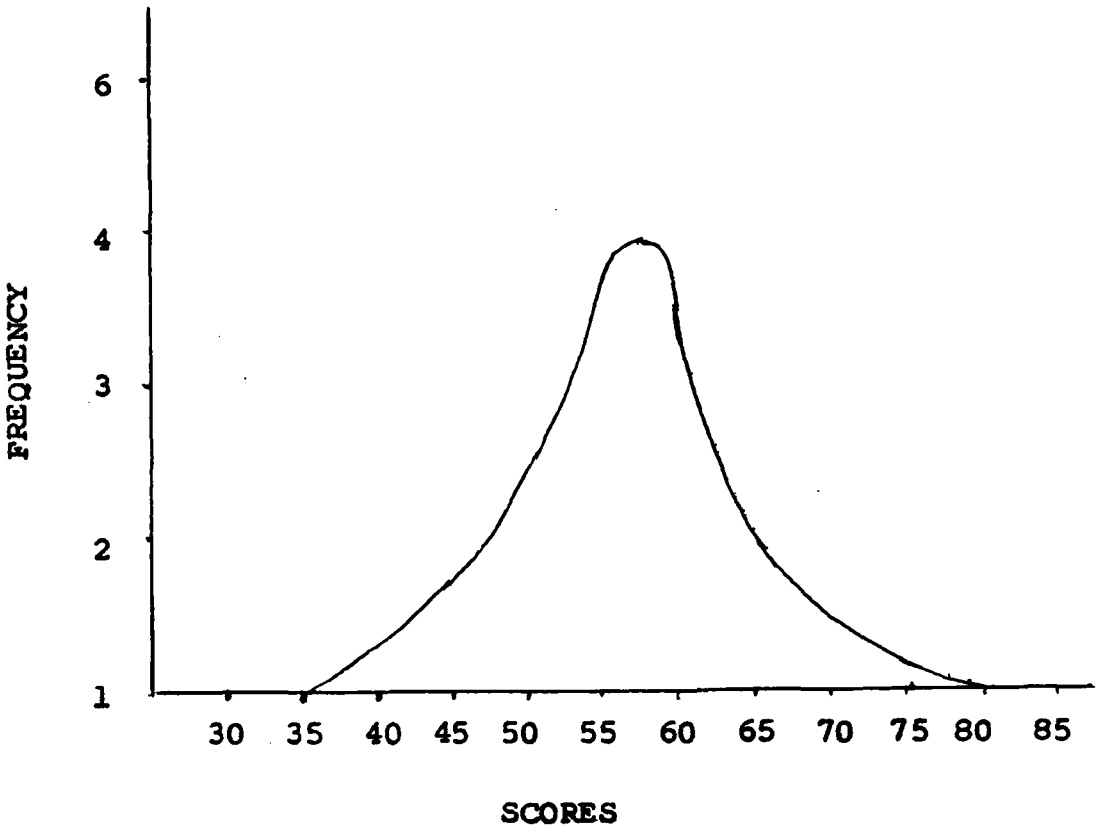


FIG. 4.2 : Distribution of Previous Achievement Scores of Experimental Group I (Programmed Learning).

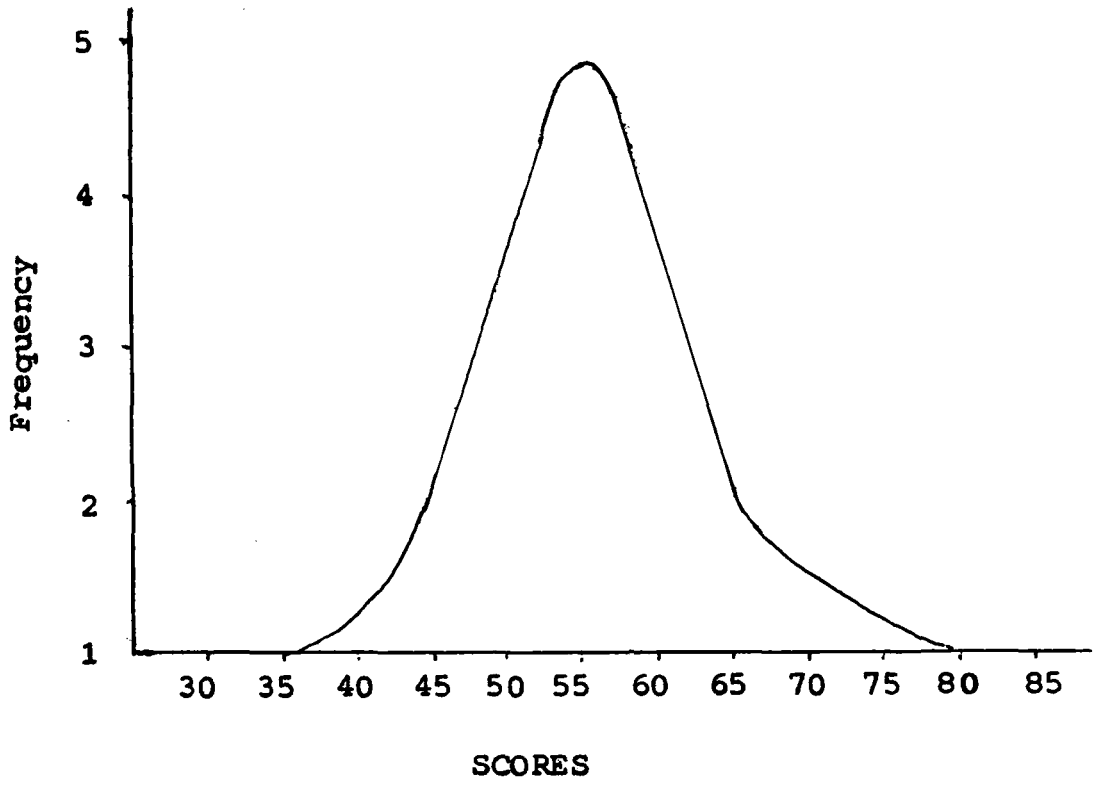


FIG. 4.3 : Distribution of Previous Achievement Scores of Experimental Group II (Expository Learning).

Basic Assumptions

In the present study analysis of covariance has been employed to study the effectiveness of three instructional treatments after controlling the effect of intelligence. The t-test has been employed to study the interaction between intelligence and achievement through three instructional treatments, conventional teaching style in class room situation and expository and programmed texts under distance learning situations. The legitimate use of these statistical techniques is based on certain basic assumptions which must be satisfied for dependable results.

According to Popham (1967), the assumptions which must be satisfied for the proper interpretation of analysis of covariance are:

(1) The relationship between two variables must be linear.

(2) The homoscedasticity between the two variables must exist.

(3) The variance in the groups must be relatively homogeneous, i.e., have equal variance.

(4) The measures must be randomly drawn.

The two assumptions for the interpretation of the results of covariance are that the distributions must be linear and homoscedastic. These assumptions are fairly important in case of coefficient of correlation and linear regression, but

in the case of analysis of covariance, a stringent satisfaction of these assumptions is not needed. Popham (1967) also writes that for the interpretation of covariance results "stringent satisfaction of these is probably not required but the departure from them should not be too large." It can be argued that if the distribution of the two variables is normal, the relationship between them will also be linear. Since the stringent satisfaction of the assumption of linearity is not needed in the case of covariance, the normality of the distribution of the variables was considered sufficient for the satisfaction of the assumptions of linearity. Again, homoscedasticity is also satisfied if the distribution are linear. Since homoscedasticity depends upon linearity and linearity depends upon normality of the distribution, therefore, normality of the distribution can be considered sufficient for the satisfaction of the assumptions of linearity and homoscedasticity.

Therefore, only normality of distribution considered sufficient to take care of the first two assumptions, namely linearity and homoscedasticity between two variables. Homogeneity of variances in the groups is an another important assumption and can be tested.

The interpretation of t-test results also requires the satisfaction of the following two assniptions (Popham, 1967).

(1) The sample data must be drawn randomly from the population.

(2) The population from which each sample is drawn must be normally distributed.

Thus, in the final analysis, the following three assumptions were needed to be satisfied for the proper use of analysis of covariance and t-test:

(1) The sample data must be drawn randomly from the population.

(2) The population from which each sample is drawn must be normally distributed.

(3) The variances in the groups must be homogeneous.

Satisfaction of Assumptions

Assumption 1 : Since the assignment to instructional treatment was random and observations were independent the assumption that measures must be randomly drawn satisfy in itself.

Assumption 2 : The satisfaction of this assumption requires that the population from which each sample is drawn must be normally distributed. For this purpose, in practice it is usually considered satisfactory that the samples themselves do not depart drastically from normality.

There are different techniques available to test the normality of distribution. The test of goodness of fit is

a very rigourous test of normality and is not warranted for the present study. The other method consists in calculating the values of kurtosis and skewness which should not depart from normality. This is a very satisfactory test of normality. However, in the present study one is required to test only that distribution does not depart drastically from normality. Perhaps this requirement can be taken care of by a simple statistics in which the ratio between the range and standard deviation (SD) is the main consideration and indicates the drastic departure from normality. The range, means and standard deviation and the ratio between range and SD of post-test scores are presented in table V and table VI.

The values of the ratio between range and S.D. of post-test scores and intelligence test scores of the three groups range from 4.96 - 5.42 and 3.90 - 4.32 respectively which are fairly satisfactory and indicate the fact that distributions do not depart drastically from normality. The figures 4.4, 4.5 and 4.6 present the distribution of post-test scores and figures 4.7, 4.8 and 4.9 present the distribution of intelligence test scores of the three groups which also show that distribution of these scores do not depart drastically from normality.

Assumption 3 : The satisfaction of this assumption requires that the variance in the groups must be relatively homogeneous,i.e., the groups must have equal variances. Hartley's

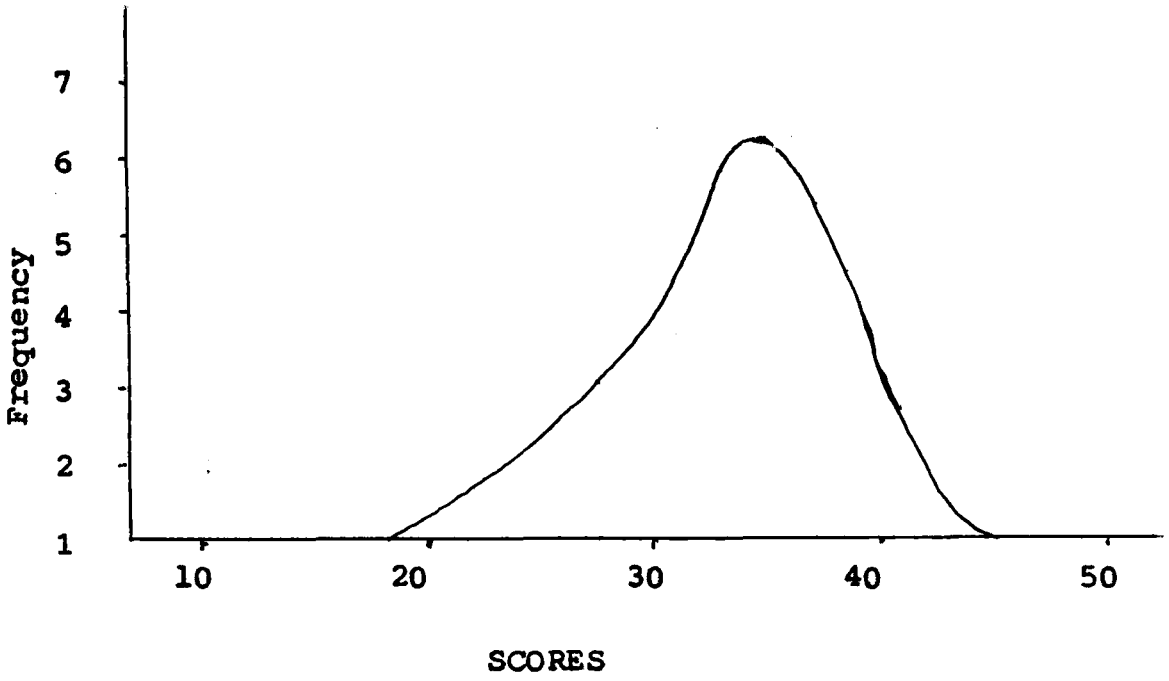


FIG. 4.4 : Distribution of Post-test Scores of Control Group.

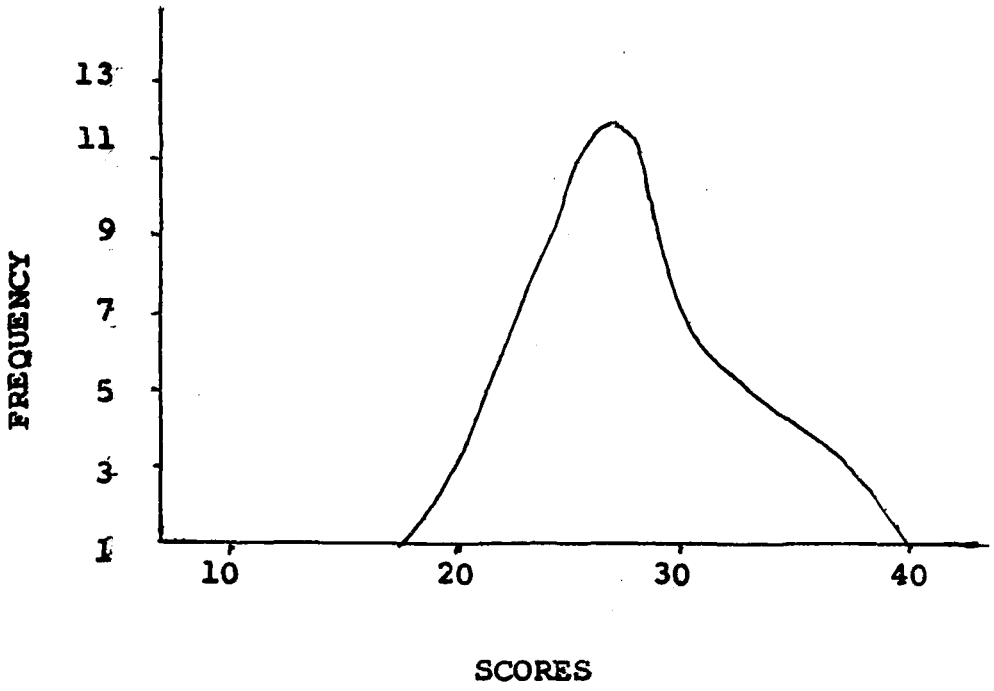


FIG. 4.5 : Distribution of Post-test Scores of Experimental Group I (Programmed Learning).

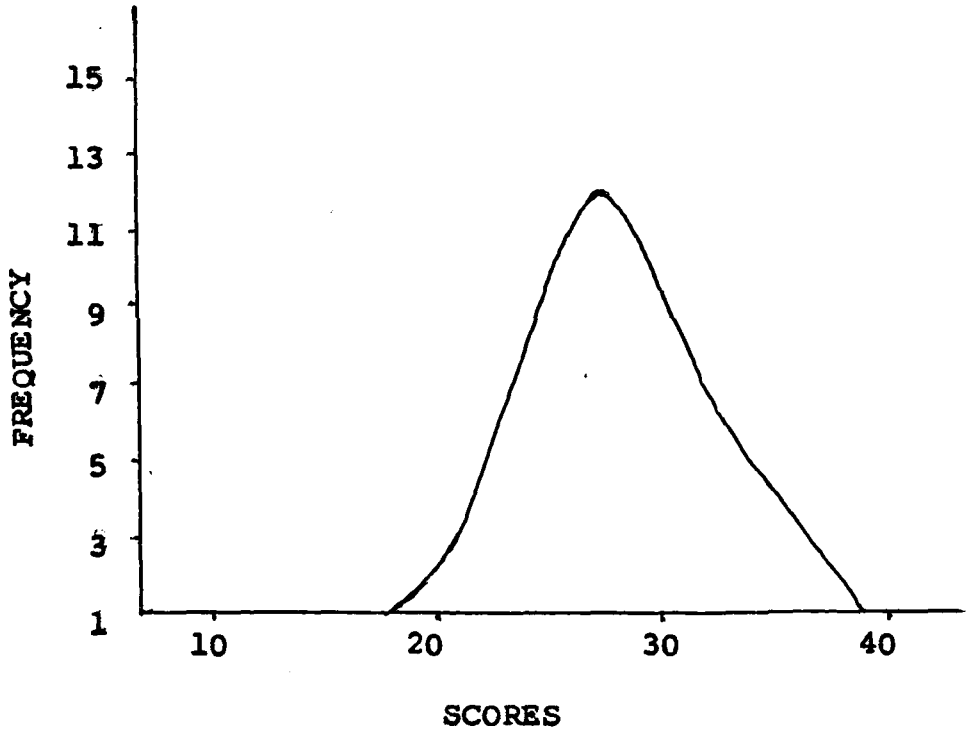


FIG. 4.6: Distribution of Post-test Scores of Experimental Group II (Expository Learning).

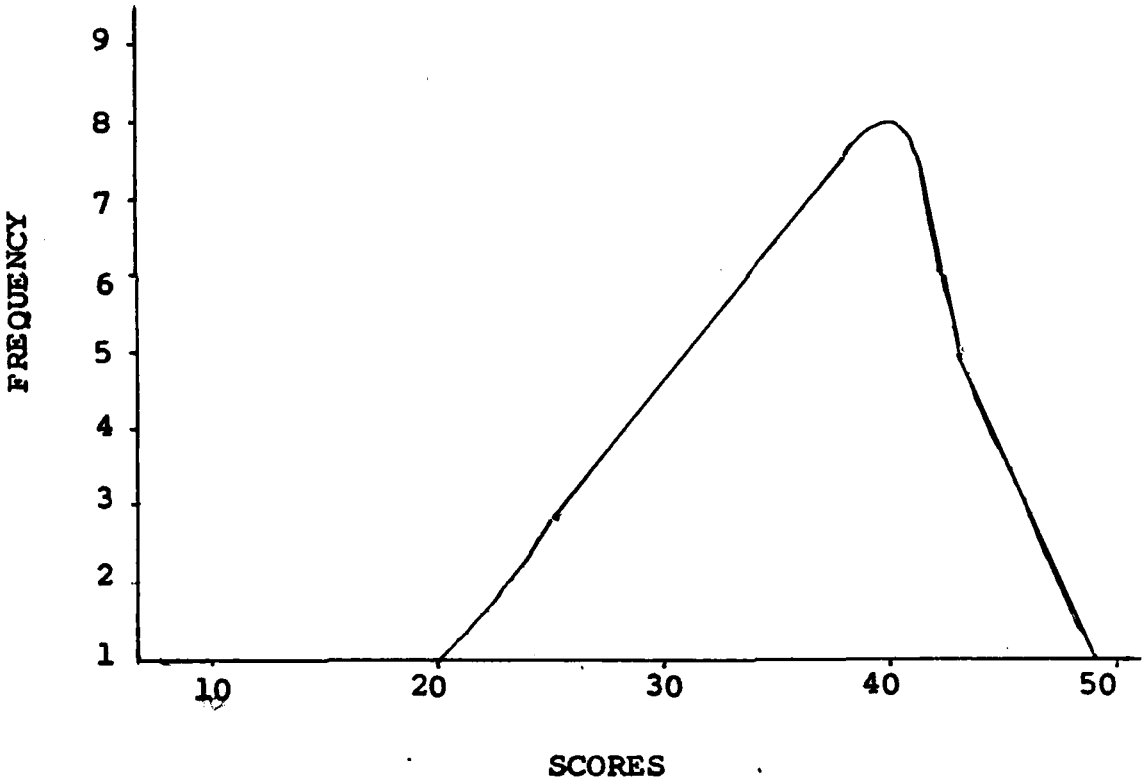


FIG.4.7: Distribution of Intelligence Test scores of Control Group.

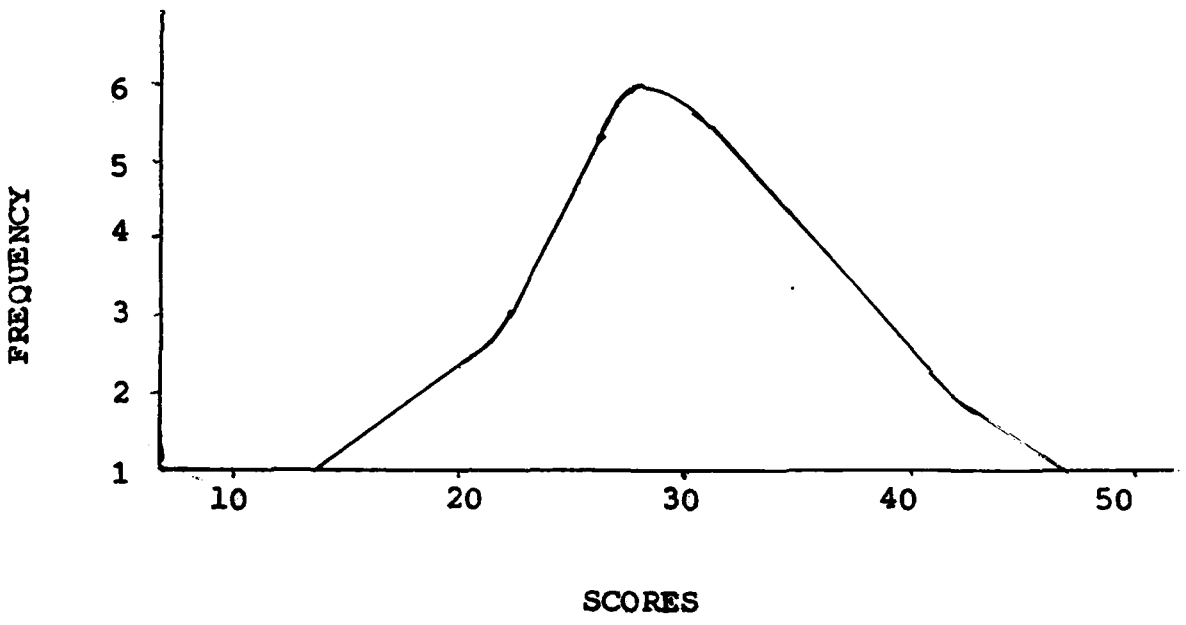


FIG. 4.8 : Distribution of Intelligence Test Scores of Experimental Group I (Programmed Learning).

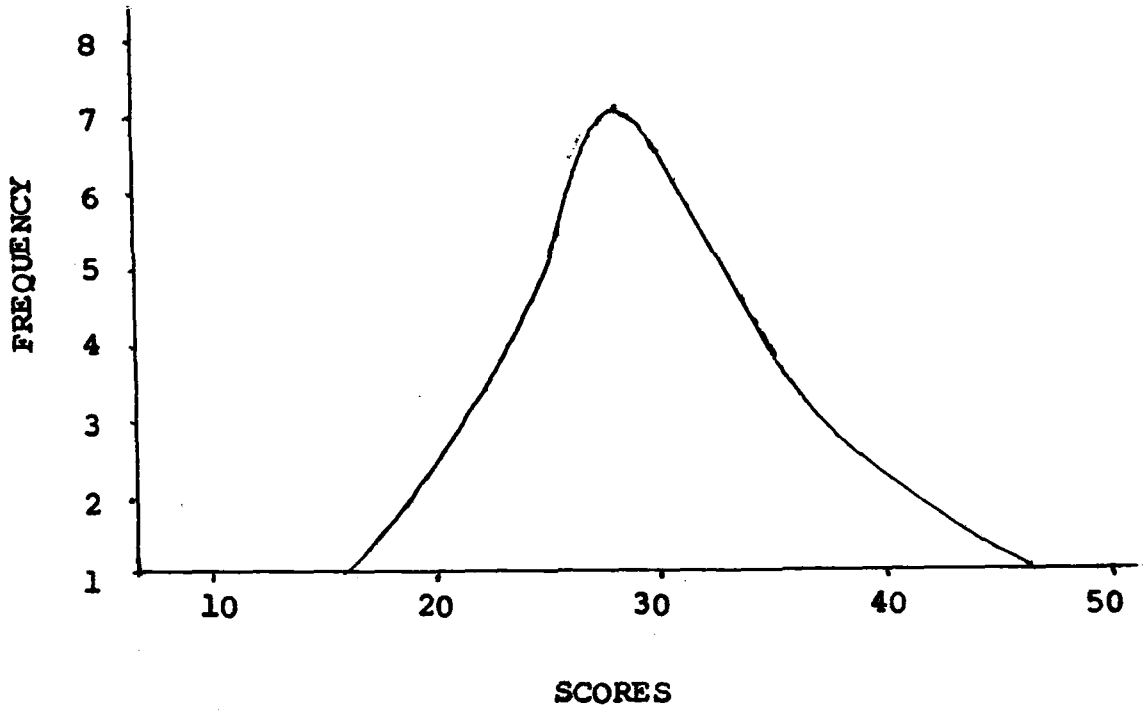


FIG. 4.9: Distribution of Intelligence Test Scores of Experimental Group II (Expository Learning).

TABLE V - Range, Means, SD and Ratio between range and SD of post-test scores of the three groups.

	Control	Experimental I (Programmed learning)	Experimental II (Expository learning)
Range	26	20	20
Mean	34.11	29.60	29.30
S.D.	5.24	3.69	3.78
Ratio = $\frac{\text{Range}}{\text{S.D.}}$	4.96	5.42	5.29

TABLE VI - Range, Means, S.D., and Ratio between Range and S.D. of Intelligence test scores of the three groups.

	Control	Experimental I (Programmed learning)	Experimental II (Expository learning)
Range	29	32	32
Mean	37.77	30.20	30.80
S.D.	7.14	7.38	8.19
Ratio = $\frac{\text{Range}}{\text{SD}}$	4.06	4.33	3.90

(1950) test was applied to test the homogeneity of variances. This test yields a constant known as F_{max} which can be defined as the ratio of maximum variance to minimum variance of the group under study. The significance of F_{max} can be checked against the table of F_{max} for various levels of significance.

An inspection of F_{max} values presented in tables VII and VIII are all insignificant showing that variances in all groups are relatively homogeneous.

The discussions presented above show that the basic assumption for the legitimate use of the analysis of covariance and t-test have been satisfied, therefore, the conclusions based on the use of these statistical techniques are likely to be dependable.

STATISTICAL TREATMENTS

(1) Analysis of Covariance - The design of study required the comparison of post-test scores obtained by the three matched groups after receiving instructional treatments. It was also proposed to control the effects of intelligence on the post-test scores. The analysis of covariance is a statistical technique which satisfied thds requirement. It yields post-test scores adjusted for the differences in intelligence, which can be compared for estimating the effectiveness of different treatments. The computations

TABLE VII

Homogeneity of Variance for Post-test Scores

Groups	Control	EXP.I (Programmed learning)	EXP.II (Expository learning)	$F_{max} = \frac{\sigma^2_{(max)}}{\sigma^2_{(min)}}$
S.D.(σ)	5.24	3.69	3.89	2.08 (Between Control & Exp.I)
				1.81 (Between Control & Exp.II)
Variance $(\sigma)^2$	27.45	13.16	15.13	1.15 (Between Exp.I & Exp.II)

TABLE VIII

Homogeneity of Variances for Intelligence Test Scores

Group	Control	EXP.I (Programmed learning)	EXP.II (Expository learning)	$F_{max} = \frac{\sigma^2_{(max)}}{\sigma^2_{(min)}}$
S.D.(σ)	7.14	7.38	8.19	1.06 (Between Control & Exp.I)
				1.31 (Between Control & Exp.II)
Variance $(\sigma)^2$	50.98	54.46	67.07	1.23 (Between Exp.I & Exp. II)

involved in this analysis are presented below.

(1) Computations for control and experimental Group I (Programmed Learning)

Tables IX and X present sums, means, sum of squares and sum of cross products of post-test and intelligence test scores of the control and experimental group I (Programmed Learning).

The means, sums of squares and cross products of the post-test scores and intelligence test scores obtained from experimental group I (programmed learning) and control group presented in tables IX and X were employed for the calculation of sum of squares and cross-products in deviation form. The computations are presented below:

(a) Calculation of sum of squares in deviation form for post-test scores -

For total sample :

$$\Sigma y^2 = \Sigma Y^2 - \frac{(\Sigma Y)^2}{N}$$

$$= 58539 - \frac{(1805)^2}{57} = 1380.67$$

For within the sub-groups :

$$\Sigma y^2 = \Sigma Y^2 - \left[\frac{(\Sigma Y_a)^2}{N_a} + \frac{(\Sigma Y_b)^2}{N_b} \right]$$

$$= 58539 - \left[\frac{(916)^2}{27} + \frac{(889)^2}{30} \right]$$

$$= 1118.82$$

TABLE IX : Sums and Means of Post-test Scores and intelligence test scores of Control and Experimental I groups.

Group	N	POST-TEST SCORES		INTELL.TEST SCORES	
		$\sum Y$	$\bar{Y}$	$\sum x$	$\bar{X}$
Control	27	916	33.92	1019	37.74
Experimental Group I	30	889	29.63	905	30.16
TOTAL	57	1805	31.66	1924	33.75

TABLE X - Sums of squares and cross products of control and Experimental Group I combined.

Scores	Symbols	Total
Post-test	$\sum Y^2$	58,539
Intelligence Test	$\sum X^2$	68,796
Cross product	$\sum XY$	62,132

(b) Calculation of sum of squares in deviation form for intelligence test scores.

For total sample :

$$\sum x^2 = \sum X^2 - \frac{(\sum X)^2}{N}$$

$$= 68796 - \frac{(1924)^2}{57} = 3852.56$$

For within the sub-groups :

$$\sum x^2 = \sum X^2 - \left[\frac{(\sum X_a)^2}{N_a} + \frac{(\sum X_b)^2}{N_b} \right]$$

$$= 68796 - \left[\frac{(1019)^2}{27} + \frac{(905)^2}{30} \right]$$

$$= 3037.36$$

(c) Calculation of sum of cross products in deviation form.

For total sample :

$$\sum xy = \sum XY - \frac{(\sum X)\ (\sum Y)}{N}$$

$$= 62132 - \frac{(1924 \times 1805)}{57}$$

$$= 1205.33$$

For within the sub-groups :

$$\sum xy = \sum XY - \left[\frac{(\sum X_a)\ (\sum Y_a)}{N_a} + \frac{(\sum X_a)\ (\sum Y_b)}{N_b} \right]$$

$$= 62132 - \left[\frac{(1019 \times 916)}{27} + \frac{(905 \times 889)}{30} \right]$$

$$= 743.31$$

The sums of squares and cross products in deviation form are presented in the following table.

TABLE XI

Sums of squares and cross products in deviation form for experimental I and Control groups

Source	$\sum y^2$	$\sum x^2$	$\sum xy$
Total sample	1380.67	3852.56	1205.33
Within sub-group	1118.82	3037.36	743.31

The sum of squares and cross products in deviation form for control and experimental group I obtained from the above calculations were employed for the analysis of covariance of post-test scores. The following table presents the analysis of covariance of post-test scores. The sum of squares of residuals were calculated by the following formula:

$$\text{Sum of squares of residuals} = \sum y^2 - \frac{(\sum xy)^2}{\sum x^2}$$

$$\text{For total group} = 1380.67 - \frac{(1205.33)^2}{3852.56}$$

$$= 1003.56$$

For within the sub-groups = $1118.82 - \frac{(743.31)^2}{3037.36}$

$= 936.91$

TABLE XII

Analysis of Covariance of Post-test Scores for Control and Experimental Group (I)

Source	Degrees of freedom	Residuals sums of squares	Mean squares
Total	55	1003.56	
Within sub-groups	54	936.91	17.35
Difference	1	66.65	66.65

$$F = \frac{66.65}{17.35} = 3.84$$

The criterion means of the post-test scores adjusted for the effect of intelligence were obtained by computing within sub-groups regression coefficient by the following formula:

$$a = \frac{\Sigma xy}{\Sigma x^2}$$

$$a = \frac{743.31}{3037.36} = 0.24$$

The post-test means adjusted for intelligence were calculated by the formula:

$$\bar{Y}_{(adjusted)} = (\bar{X}_{group} - \bar{X}_{total})\ a$$

(i) $\bar{Y}_{(\text{adjusted experimental})} = (30.16 - 33.75) \times 0.24 = -.876$

Adjusted post-test mean for experimental I group:

$= 29.63 + (-.876) = 28.75$

(ii) $\bar{Y}_{(\text{adjusted control})} = (37.74 - 33.75) \times 0.24 = .973$

Adjusted post-test mean for control group

$= 33.92 + .973 = 34.89$

(2) Computations for Control and Experimental Group II (Expository Learning).

Tables XIII and XIV present the sum, means, sums of squares and cross products of post-test and intelligence test scores of the control and experimental group II (Expository Learning).

The means, sums of squares and cross products of the post-test scores and intelligence test scores obtained from experimental group II (expository learning) and control group presented in tables XIII and XIV were employed for the calculation of sum of squares and cross products in deviation form. The computations are presented below:

(i) Calculation of sum of square in deviation form for post-test scores:

$$\Sigma y^2 = 57761 - \frac{(1792)^2}{57}$$

$$= 1423.04$$

TABLE XIII - Sums and means of post-test scores and intelli-test scores of Experimental II and Control groups.

Group	N	POST-TEST SCORES		INTT.TEST SCORES	
		ΣY	$\bar{Y}$	ΣX	$\bar{X}$
Control	27	916	33.92	1019	37.74
Experimental Group II	30	876	29.20	926	30.87
Total	57	1792	31.44	1945	34.12

TABLE XIV - Sums of Squares and Cross-products of Control and Experimental Group II combined.

Scores	Symbols	Total
Post-test	ΣY^2	57,761
Intelligence test	ΣX^2	70,463
Cross product	ΣXY	62,680

For within the sub-groups:

$$\sum y^2 = 57761 - \left| \frac{(916)^2}{27} + \frac{(876)^2}{30} \right|$$

$$= 1105.65$$

(ii) Calculation of sum of squares in deviation form for Intelligence test scores.
For Total Sample:

$$\sum x^2 = 70463 - \frac{(1945)^2}{57}$$

$$= 4094.14$$

For within the sub-groups:

$$\sum x^2 = 70463 - \left| \frac{(1019)^2}{27} + \frac{(926)^2}{30} \right|$$

$$= 3422.66$$

(iii) Calculation of sum of cross products in deviation form - for total sample:

$$\sum xy = 62680 - \left| \frac{(1945 \times 1792)}{57} \right|$$

$$= 1531.93$$

For within the sub-groups:

$$\sum xy = 62680 - \left| \frac{(1019 \times 916)}{27} + \frac{(926 \times 876)}{30} \right|$$

$$= 1070.28$$

The sums of squares and cross products in deviation form are presented in the table XV.

TABLE XV

Sums of squares and cross products in deviation form for Experimental II (Expository learning) and Control Group.

Source	Σy^2	Σx^2	Σxy
Total sample	1423.04	4094.14	1531.93
Within sub-groups	1105.65	3422.66	1070.28

The sums of squares and cross products in deviation form for control and experimental II groups obtained from the above calculations were employed for the analysis of covariance of post-test scores.

TABLE XVI

Analysis of Covariance of Post-test Scores for Control and Experimental II (expository learning) groups

Source	Degree of freedom	Residuals sums of squares	Mean squares
Total	55	849.83	
Within sub-groups	54	770.97	14.28
Difference	1	78.86	78.86

$$F = \frac{78.86}{14.28} = 5.52$$

The criterion means of post-test scores adjusted for the effect of intelligence were obtained by computing within sub-group regression coefficient by the following formula:

$$a = \frac{\Sigma xy}{\Sigma x^2}$$

$$= \frac{1070.28}{3422.66}$$

$$= 0.31$$

The post-test means adjusted for intelligence

$$\bar{Y}_{(adjusted)} = (\bar{X}_{group} - \bar{X}_{total})\ a$$

(i) $\bar{Y}_{(experimental)} = (30.87 - 34.12) \times .31 = -1.01$

Post-test mean after adjustment for experimental II group

$$= 29.2 + (-1.01)$$

$$= 28.19$$

(ii) $\bar{Y}_{(control)} = (37.74 - 34.12) \times .31 = 1.13$

Post-test means after adjustment for control group

$$= 33.92 + 1.13 = 35.05$$

The unadjusted and adjusted means of the post-test scores of control, experimental I (programmed learning) and experimental II (expository learning) are presented in the table XVII.

The table XVII shows that the means of post-test scores adjusted for intelligence obtained by both experimental groups, i.e., those receiving instructions through programmed learning,

lesson text and expository text in distance learning situations are significantly smaller than those obtained through conventional class room methods. Thus the evidence does not favour the use of these techniques for distance learning situations at least when there is no difference in intelligence of students. Thus the hypothesis No.1 which stated that linear programmed lesson text involves overt interaction, reinforcement and feed back therefore it is considered that it is likely to prove more effective than the expository lesson text, does not hold good.

TABLE XVII

Unadjusted and Adjusted Post-test Means of Control, Experimental I and Experimental II Groups obtained by analysis of covariance

Groups	N	Unadjusted Means	Adjusted Means
Control	27	33.92	34.89
Experimental I	30	29.63	28.75
Control	27	33.92	35.05
Experimental II	30	29.20	28.19

Significance of Difference Between the Means of the post-test scores of high and low intelligence students

An interaction between intelligence and achievement through different instructional treatment is likely to occur, which implies that the students of high and low intelligence may achieve differently with different instructional treatments.

It was ascertained by comparing the means of post-test scores obtained by low and high intelligence students of the three groups of students. The t-test was employed to study the significance of difference between means of post-test scores of high and low intelligence students of the three groups of students under study. The following table presents the t-values for the means of post-test scores of high and low intelligence students of control and experimental group I (programmed learning).

TABLE XVIII

t-Values for the Means of Post-test Scores of high and low intelligence students of Control and Experimental Group I (Programmed Learning)

Groups	HIGH INTELLIGENCE		LOW INTELLIGENCE	
	Control	Experimental	Control	Experimental
N	10	11	10	11
Mean	36.60	30.18	32.30	29.36
t-value	3.13		1.55	

It will be seen from the above table that the high intelligence students of the control group have obtained significantly higher (t-value being significant even beyond .01 level) than the experimental group I on the post-test showing thereby that the conventional teaching is more effective than the instructions through distance teaching lesson based on Skinner's linear programming technique. This finding could

well be expected because it is well known that the students of high intelligence prefer expository teaching method as compared to a linear programme where they get somewhat bored because of the small steps and too frequent feeback and reinforcement.

The difference in the achievement of the low intelligence students of control and the experimental group I (programmed learning) is insignificant showing that both the instructional treatments are equally effective for such students. Conventional method involves much more expenditure than the instruction through distance learning and if the gains are nearly equal, then for the economic reasons alone learning through programmed lessons in distance situations should be preferred.

The discussion presented above shows that the investigator's hypothesis No. 2, i.e., in distance learning situations linear programmed lesson text would yield better results with students of lower intelligence than those of higher intelligence, is satisfied to a fair degree.

Table XIX presents the t-values for the mean of post-test scores of high and low intelligence students of control and experimental group II (Expository learning).

The difference between the post-test achievement scores of high intelligence students of the control and the experimental groups receiving instruction through expository text in

TABLE XIX

t-Values for the means of the post-test scores of high and low intelligence students of Control and Experimental Group II (Expository Learning)

Groups	HIGH INTELLIGENCE		LOW INTELLIGENCE	
	Control	Experimental	Control	Experimental
N	10	11	10	11
Mean	36.60	30.18	32.30	27.54
t-value	2.84		2.97	

distance learning situations is similar to one which was between the control and experimental group I. This is also significant beyond .01 level which shows that the high intelligence students achieve better in face to face situations than in distance learning situations.

This finding is not in conformity with the hypothesis No.3, i.e., the students of comparatively high intelligence are likely to achieve better through expository lesson text than their lesser endowed counterparts, suggested by the investigator on the basis of previous researches and theoritical rational. The high intelligence students in the sample also achieved better through conventional instructions and did not achieve high through expository text in distance learning situations as is envisaged in the hypothesis No.3.

The difference in post-test achievement of the low

intelligence students of the control and experimental group II is also large and significant beyond .01 level which shows that students of low intelligence also prefer face to face teaching than distance learning through expository texts.

A comparison of the conclusions arrived at after the analysis of the post-test scores of the three groups of students presented in table XVIII and table XIX shows that lessons based on expository texts are not suitable for distance learning situations but lessons based on Skinner's linear programming technique achieve almost similar results as those obtained through face to face learning situations which entail large expenditure. Therefore, these lesson texts may be adopted at least for low intelligence students. The study has shown futility of adoption of expository lesson texts for distance learning situations. This is perhaps due to the fact that in a programmed lesson texts the student gets frequent reinforcements and feedback just like in face to face learning situations which is essential for learning and unlike classroom situations, a low intelligence student can proceed at his own pace and can refer back to the portion of the course what he has already been learned to clarify any doubts. This is also borne out of the table XX.

It will be seen from the table XX that the achievement for the high intelligence students through two instructional treatments under distance learning situations is similar but

TABLE XX

t-values for the means of the post-test scores of high and low intelligence students of Experimental I and Experimental II Groups

Groups	HIGH INTELL.		LOW INTELL.	
	Exp. I	Exp. II	Exp. I	Exp. II
N	11	11	11	11
Mean	30.18	30.18	29.36	27.54
t-value			1.18	

is less than that in class room situations. But the students of low intelligence has achieved a mean of 29.36 through programmed lesson texts and a mean of 27.54 through expository texts.Under distance learning situations, the difference being insignificant showing that the students of low intelligence students have profited somehow little more through programmed lesson texts than those students of low intelligence who received instruction through expository texts under distance learning situations.

If the t-value for the difference of the means post-test scores of two extreme groups is significant, the interaction is also significant. But only the significance of difference of the means of post-test scores is not sufficient indication of assignment of students to the two instructional treatments for optimum gains. This assignment depends upon the crossing or otherwise of the two treatment lines. If the treatment lines do not cross, the interaction

is called ordinal and in this case the need for differential assignment does not arise. If the treatment lines cross and the means of achievement at either low or high level are also significantly different, the interaction is called disordinal. In order to ascertain the nature of interaction the graphs of treatment lines were also plotted, which are presented in figures 4.10 and 4.11

These figures show that the treatment lines do not intersect, therefore, differential treatment cannot be provided. However, the figures do indicate that the low intelligence students achieve more or less similar on the post-test scores (the difference between the means being insignificant) obtained through conventional classroom situations and that through programmed lessons in distance learning situations.

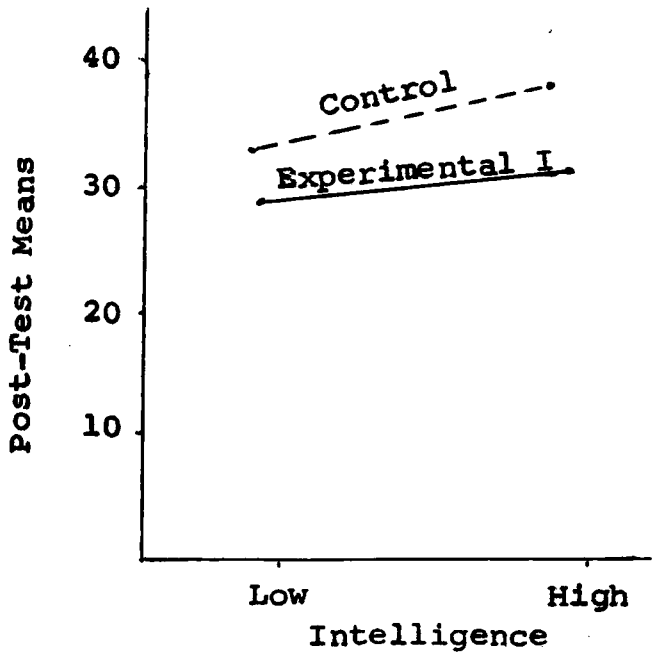


FIG.4.10 : Ordinal interaction for Control and Exp.I (Programmed Learning) Groups.

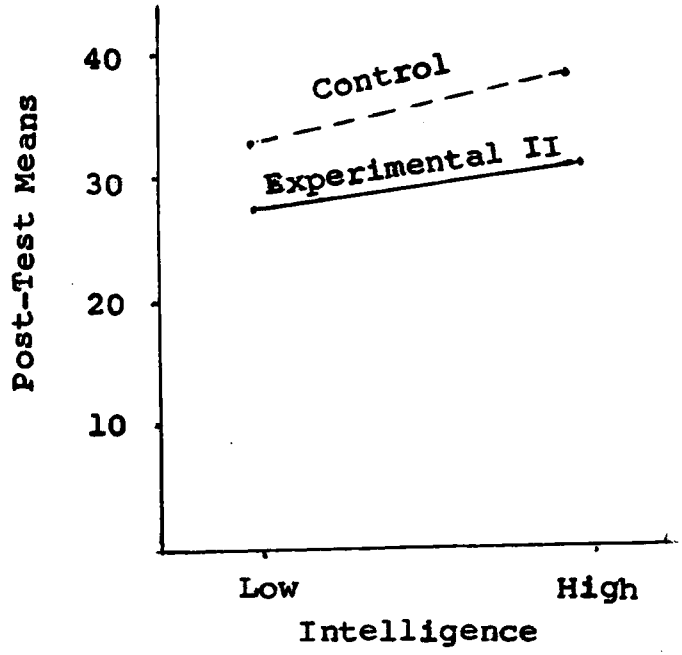


FIG.4.11: Ordinal interaction for Control and Exp.II (Expository Learning) Groups.

Chapter V

SUMMARY, CONCLUSIONS AND SUGGESTIONS

SUMMARY

Distance education is a flexible system of education which is beyond the limitations of age and time boundations. Its main objectives are to provide an efficient and less expensive method of education at a higher level in context of the national development of India. It provides a chance on the part of all individuals to improve their professional, educational and economic status. It also provides equal opportunity of education to all without considering the social and economic barriers of society.

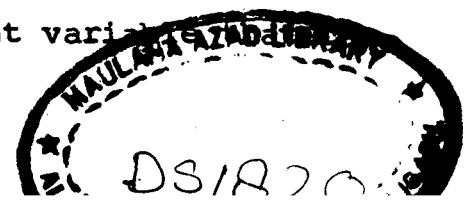
Though different names have been ascribed to distance learning as correspondence education, distance education, distance teaching etc., in all the cases it is a process of independent study in which the learner is at a distance from the teacher or teaching organisation. It promotes individualized learning through correspondence lessons on the one hand= and becomes a means of mass education by the use of multimedia instructional system.

In distance education there is no face to face contact between teacher and the learner. The learner studies through

the lessons sent to him by teaching organisations. Therefore, the lessons must be self-sufficient and must compensate for at least a part of good teacher's activity. It must motivate the learner for self-study and provide reinforcement. A linear programmed instruction based on the principles of Skinner's theory of operant conditioning may be helpful in this regard. In this style of instruction, the learning content is divided into small units called frames. Each frame contains some information and a question which is to be responded by the learner. The cues or prompts are provided at each step for ensuring correct response by the learner which are gradually withdrawn from the succeeding frames. The learner's response is confirmed at each step which is reinforcing and motivating to him for further study.

The present study seeks to investigate the effectiveness of linear programmed and expository texts for distance learning situations. The related studies conducted for this purpose are few and far between because of the recent interest evinced by the researchers in this field. The studies conducted by Basu (1968), Short (1968), Davidson and Swann (1969), Mullick (1964), Saeed (1988) etc. show the effectiveness of programmed instruction texts for distance learning.

Many personological and mental ability variables affect the achievement through different instructional treatments. Intelligence is one of the most important vari



affect the achievement. Therefore, it was also proposed to study the interaction effects between intelligence and post-test scores obtained through different instructional treatments in distance learning situations.

Objective of the Study

In specific terms the present study seeks to answer the following questions:

(a) What is the relative effectiveness of linear programmed and expository lesson texts for distance learning situations?

(b) What is the interaction between linear programmed and expository texts and learner's intelligence?

Three groups of students of class VI were matched on the basis of their previous over all achievement. The previous achievement was selected as a criterion of matching as it encompasses the effects of all the variables which determine the academic achievement. All the t-values for the means of previous over all achievement of the three matched groups were found insignificant thereby showing that the distribution of previous achievemement scores is nearly similar for the three groups. 'The use of articles' was selected for three instructional treatments. A pre-test was administered to the three groups to see that whether the students possessed the entry level behaviours for successful learning through

instructional treatments and that they do not possess any behaviours which was proposed to be taught through the treatments. One of these groups (Control group) was taught through the conventional method of teaching in classroom situations. The second group (experimental group I) received instruction through linear programmed text and the third group (experimental group II) received instruction through expository text, both under distance learning situations. Mehta's general intelligence test was administered to study the interaction effects between intelligence and instructional treatments. A post-test was also administered to the three groups to study the effectiveness of the three instructional treatments. The post-test scores were compared by the help of analysis of covariance to study the effectiveness of linear programmed and expository texts under distance learning situations. Analysis of covariance was employed for this purpose because it yields means of post-test scores adjusted for the effect of controlled variable, i.e., intelligence. The means of post-test scores of high and low intelligence students were compared and the t-test was employed to study the interaction effects between intelligence and three instructional treatments.

CONCLUSIONS

Analysis of covariance, which was employed to study the effectiveness of linear programmed and expository texts under

distance learning situations, yielded means of post-test scores adjusted for the effects of controlled variables, i.e., intelligence for the three groups, which are presented in the following table:

TABLE XXI : Adjusted means of the post-test scores of the three groups obtained by analysis of covariance.

Groups	N	Adjusted Means of post-test scores
Control	27	34.89
Experimental I (Programmed learning)	30	28.75
Control	27	35.05
Experimental II (Expository learning)	30	28.14

The above table shows that the adjusted post-test means for the two experimental groups, i.e,, those receiving instruction through programmed texts and expository texts under distance learning situations are significantly lower than that of control group (those taught in conventional class room situations). These results are not in favour of the investigator's hypothesis No.1, which expected the more efficiency of programmed lesson texts than expository texts under distance learning situations. This evidence does not favour the use of these lesson texts for distance learning situations, at least when there is no differentiation of students with

regard to intelligence.

The t-values obtained for the means of post-test scores of high and low intelligence students of the three groups are presented in the following table.

TABLE XXII : t-values for the Means of the post-test scores of High and Low Intelligence Students of the three groups.

Groups	Post-test means High intelligence	t-value	Post-test means low intelligence	t-value
Control	36.60	3.13	32.30	1.55
Experimental I	30.18		29.36	
Control	36.60	2.84	32.30	2.97
Experimental II	30.18		27.54	

The above table indicates that the t-value for the differenc between post-test means of high intelligence students of control and experimental I groups is significant even beyond .01 level thereby showing that students of high intelligence favour face to face teaching than instruction through linear programmed texts under distance learning situations. The students of low intelligence of control and experimental I group (programmed learning) have achieved almost similar post-test scores (t-value being insignificant) therefore, it may be said that students of low intelligence can be profited more through programmed lesson texts and this fact is in favour of the

investigator's hypothesis No.2. This is also beneficial from economic point of view as conventional method involves much more expenditure than the instruction through distance learning.

The above table also shows that the t-values for the low as well as for high intelligence students of control and experimental II groups, receiving instruction through conventional teaching in class room situations and expository texts in distance learning situations respectively, are significant even beyond .01 level. This significance of t-values is not in favour of the investigator's hypothesis No.3, which expected that the students of comparatively high intelligence are likely to achieve better through expository lesson texts than students of low intelligence under distance learning situations. It may be said that the students of low as well as high intelligence favour face to face teaching in class room situations than instruction through expository texts under distance learning situations.

From the above discussion, we may conclude that the use of expository lesson texts are not fruitful in distance learning for high as well as low intelligence students and the programmed lesson texts may be adopted for low intelligence students perhaps due to the fact that through programmed lesson texts, the student gets frequent reinforcements and feedback just like in face to face teaching situations and he can also

proceed at his own pace unlike class room situations, where he has to proceed with the whole class and the teacher. Therefore the adoption of programmed lesson texts in distance situations may be appreciated.

SUGGESTIONS

(1) The study has shown that the students of low intelligence achieve nearly as much as through programmed lesson text in distance learning situations as achieved by such students through face to face conventional teaching, perhaps because in such a text, the student can proceed at his own pace and that they can refer back to the subject matter already completed as and when they needed. Therefore, a programmed lesson text in distance learning situations is a more economical proposition as compared to expository text and may be adopted at least for such students.

(2) The post-test scores obtained by the high intelligence students through programmed lesson text and also through expository texts in distance learning situations are almost similar. This may be perhaps due to small steps in a programmed text and large expository text without the provision of reinforcement and feedback. It may be that if larger frames based on Skinner's principles of programming technique with built-in reinforcement and feed back or Crowder's branching frames are employed, the high intelligenve students may profit

more than through conventional teaching. Even if their achievement is similar, then instruction through distance lessons texts may adopted because of lesser involvement of money.

(3) The efficiency of expository texts with overviews serving as advanced organisers, study questions for constant reinforcement and exercises for feed back may be examined for distance learning situations.

Efforts for making distance learning more effective by designing suitable lessons are needed to be intensified if we want to achieve the ideals of universalization of education and spread of education at the higher levels. The present investigator is conscious of the many short comings of the present study but it is being submitted with the hope that it will motivate other researchers in the field of take up projects with the objective of improving the efficiency of distance learning and thus contributing their might for the great national endeavour.

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ACHIEVEMENT TEST

Name _____ Class _____

I. Fill in the blanks with 'a' or 'an' or 'the' where necessary. Put a cross if no article is needed.

1. _____ youngest brother is at ____ school now. If you go to _____ school by ____ bus you can meet him there.
2. He makes ____ toys in _____ evening.
3. ____ man sitting on the other side of ____ road is blind.
4. Jack and Jill went up ___ hill to fetch ___ pail of ____ water.
5. ____ orange grows on ____ tree.
6. I have ____ breakfast at eight.
7. ____ Ganga is ____ biggest river of India.
8. The crow is ____ cleaver bird.
9. ____ cautious are not always ____ coward.
10. ____ wicked flee when no one supports.

II. Tick the correct and cross the incorrect sentences.

1. Madhu is at her studies. She is late in going to the bed.
2. The cow gives us milk.
3. English is the mother tongue of both the English and the Americans.
4. Sky is the limit of our aspirations.

5. The Balasore is in the Orissa.
6. Mother, tell father to buy me a camera.

III. Fill in the blanks with a, an or the:

Jacob ____ rich shepherd had twelve sons. Joseph was ____ ____ eleventh and ____ best loved among ____ sons. Jacob gave Joseph ____ coat of many colours. ____ brothers of Joseph hated him because their father gave him ____ coat. They threw him into ____ pit. Then they took him out of ____ pit and sold him to ____ merchant. ____ merchant sold him to ____ king of Egypt.

One day ____ king had ____ bad dream. No one except Joseph could explain ____ dream. ____ happy king made him ____ officer. Then there broke out ____ famine in ____ land. ____ brothers of Joseph crossed ____ Nile and came to Egypt for corn. Joseph brought them to____palace and gave them corn.

EXPOSITORY TEST

The Definite Article

Countable and Uncountable Nouns:

We can count certain things. For example, we say one dog, two dogs, three dogs, etc. One, two, three are numbers to count things. We do not say one milk, two milks, three milks, etc. Milk is a thing which we cannot count.

When we count things, we add numbers to them. For example, I have two pens.

My sister has only one pen. In these sentences, one and two are numbers to count a thing. We cannot count certain things. We say two pens, but do not say two butters or five teas. We do not add any number to a thing which we cannot count.

Things which we can count are 'countable'. The examples of countable things are mango, egg, pen, book, etc. These are countable nouns. Things which we cannot count are 'uncountable'. The examples of uncountable nouns (things) are milk, butter, gold, oil, iron, etc.

Countable nouns may be singular or plural. For example, 'boy' is a singular noun, but 'boys' plural noun.

The other examples of countable nouns are:

Singular (One)	Plural (many)
Boy	Boys
Girl	Girls
Egg	Eggs
Chair	Chairs

Uncountable nouns do not have any plural. For example, we say 'many mangoes' but do not say 'many milks'. The 'milk' has no plural because it is an uncountable noun.

EXERCISE - I

1. Tick the words which are countable: bird, sleep, man, dinner, temple, school, smoke, mutton.

2. Tick (✓) the correct plural forms:

Singular (One)	Plural (many)
(a) Book	Books
(b) Fish	Fishes
(c) Ice	Ices
(d) Butter	Butters
(e) Ink	Inks
(f) Shop	Shops

USE OF 'A' OR 'An'

'A' or 'An' is used to mean one. For example :

A boy is crying in the lane.

This sentence speaks about one boy who is unknown. Similarly:

Sheela wants an apple.

This sentence speaks about one apple which is not particular.

'A' or 'An' is used with nouns in the singular (one) number. Only countable nouns take 'A' and 'An'. 'Boy' is a countable noun, so we can say 'a boy' in the sense of 'one boy'. 'A table' shows 'one table'.

'A' or 'An' is used before a singular nouns. So remember:-

a) Only countable nouns take 'A' or 'An'.
b) Only countable nouns have plurals.
c) 'A', 'An' and 'the' are known as 'Articles'.
d) 'A' or 'An' is used to refer any/one unknown person or thing.

EXERCISE - II

1) Write C against countable nouns and U against uncountable nouns:

Mango	Butter
Milk	Chair
Ink	Oil
Pen	Foreigner
Book	Sleep
Bird	Man

2) Fill in the blanks:

a) Things we can count are known as _____.

b) Things we cannot count are known as _____.

c) Only _____ nouns take 'A' or 'An'.

d) Only _____ nouns have plural forms.

e) 'A', 'An' and 'the' words are called _____.

f) 'A' or 'An' is used to refer _____.

'Butter' and 'gold' are the examples of uncountable nouns. 'A' or 'An' is never used before uncountable nouns.

Examples : a) Please give me a money.

b) Please give me a rupee.

c) I don't take a sugar.

d) I eat a cake.

Only (b) and (d) are correct because these have countable nouns. In sentence (c), sugar is a thing which we cannot count, we refer to its quantity like 'five kilograms of sugar'. But we can count the number of cakes.

It is wrong to say 'a milk' because milk is an uncountable noun.

EXERCISE - III

Add 'A' or 'An' where necessary. Put a cross (x) where no article is needed:

1. ____ handkerchief is made of ____ piece of cloth.
2. ____ window is made of ____ glass.
3. ____ ring is made of ____ gold and ____ silver.
4. ____ orange grows on ____ tree.
5. I drink ____ milk in the morning.
6. I drink ____ glass of milk in the morning.
7. Give me ____ rice only.
8. Give me ____ plate of rice only.
9. I want ____ glass of ____ coca cola with ____ sugar in it.
10. I like to have ____ orange instead of ____ curd.

Use of 'the'

a) There is a horse in the garden.

b) The horse in the garden is white.

In (a), we speak about 'any single horse'.
In (b), we speak about a particular horse and not any horse in general.

Similarly in the following example.

(a) Do you want a book?
(b) Take the book on the table.

'A book' do not refer to a particular or known book. But 'the book' refers to a particular book which is on the table.

See the following example:

(a) A wolf and a lamb came to stream.
(b) A wolf was stronger than a lamb.

The first sentence is correct but second sentence is wrong. It should be like this:

'The wolf was stronger than the lamb'.

Here, we have used 'the' before 'wolf' and 'lamb' because we speak about a particular wolf and a particular lamb already mentioned in the first sentence. In the following example:

a) A boy and a girl are going to the fair.
b) The girl is the boy's sister.

We have used 'the' before the words 'boy' and 'girl' because we are referring to a particular girl and a particular boy already mentioned in the first sentence.

So 'the' is not used to indicate any wolf or any lamb or any girl or any boy. It is used to indicate particular wolf and lamb or particular boy and girl mentioned in the first sentence.

'The' is used to mean somebody or something particular not anybody or any thing in general. It is used with countable and uncountable nouns. See that 'a' is wrongly used in the following sentences:

1. A milk is good for health.
2. A tea is stimulating.

Indefinite article 'a' or 'an' cannot be used with uncountable nouns like 'milk' and 'tea'.

See the following sentences:

1) A glass of milk is good for health.
2) A cup of tea is stimulating after hard work.

Here we have used 'A' before countable nouns 'cup' and 'glass'. 'Milk' and 'tea' are uncountables but 'glass' and 'cup' are countable.

Exercise IV :

I. Add 'a', 'an' or 'the where necessary:-

(1) _____ book on the shelf is an interesting one.
(2) Let us go to ____ club.
(3) ____ sun rises in the east.
(4) ____ student at the back of the class is doing sums.
(5) She is ____ charming girl.
(6) I want to talk to ____ boy of this class.
(7) I want to talk to ____ boy in the blue shirt.
(8) There is ____ fly in ____ tea.
(9) Birds can fly in ____ sky.
(10 ____ postman wears a cap.
(11) ____ postman has just put ___ letter under the door.
(12) She is ____ untidy girl.
(13) Write an essay on ____ street accident.
(14) ____ umbrella is useless against ____ storm.

II. Add 'a', 'an', or 'the' where necessary. Put a 'x' where no article is needed.

(1) The heat of ____ sun dries up ____ water.
(2) ____ water in the tap is very hot.
(3) I am thirsty. I want ____ glass of water.
(4) ____ milk is good for health.
(5) ____ milk of a black cow is very sweet.
(6) ____ thirsty crow flew to a pitcher. But ____ water in the pitcher was atlow level.

Remember :

(a) 'a' and 'an' are indefinite articles whereas 'the(is definite article.
(b) 'a' or 'an' is used with countable nouns in singular number. 'A' or 'an' is never used with uncountable nouns.
(c) 'The' is used with both countable and uncountable nouns, both in singular and plural of the countable nouns.

(d) We use 'the' before a word in the sense of a particular person or thing.

Exercise - V

(1) Add 'a', 'an' or 'the' where necessary.

i) The sale of ____ cake depends on its taste.

ii) ____ cake you are eating was made for the chief guest.

iii) ____ apple is very good to eat.

iv) Eat ____ apple your mother is giving.

v) Rahul wants ____ story book for the evening.

vi) ____ book he wants is out of print.

(2) Fill in the blanks:

(a) The words 'a', 'an' and 'the' are _____.

(b) 'The' is a _____ article but 'a' and 'an' are _____ articles.

'The' is used when we speak of a person or thing already mentioned or referred to previously.

(c) Add the correct word:-

____ man and ____ boy were going along ____ road. ____ road was dusty. ____ man was pushing ____ boy along ____ road on ____ toy bicycle. ____ bicycle belonged to ____ boy's sister.

(3) Add a/an or the where necessary:-

(a) His sister is ____ teacher. She is ill and needs treatment. He goest to ____ doctor. ____ doctor says it is ____ hopless case.

(b) ____ man who sits on ____ donkey is ____ fool.

(c) I want ____ grapes.

(d) I love ____ children. But ____ children of this house are noisy.

(e) Have you got ____ book you wanted to buy.

(f) I have given him ____ books he wanted.

(g) I want some butter on ____ potatoes. Please pass ____ butter over there.

(h) You have to act according to ____ wishes of your father.

After doing the above exercise, you have learnt that we can use the article 'the'

(a) with countables singular and plural.

(b) with uncountables.

But 'the' is used to particularize the meaning of a noun or to make the meaning definite. Read the following paragraph and see where 'the' is wrongly used:

> The (1) lean dog was wandering in search of the (2) food. He met the (3) fat dog. The (4) lean dog made friends with the (5) fat dog. (He asked the (6) fat dog, "How is it that you are so strong". The (7) fat dog said, "I work in my master's house and get good food".

Here 'the' has wrongly used at places (1), (2) and (3). The Places(1) and (3) should have 'a' because 'the' dogs are not particular.

See the use of 'the' in the following sentences:

(a) The sun shines brightly.
(b) The moon did not rise till after ten.

We have used 'the' before 'sun' and 'moon' because these unique things in the world. Similarly 'earth' is a unique thing so we use 'the' before earth.

Before things which are unique, i.e., only one, we use 'the'. Loot at the sentences:

(a) The President will come to Bhubaneswar tomorrow.
(b) The Prime Minister said this.

In these sentences, we have used 'the' before 'President' and 'Prime Minister' to mean 'the' President of India and the Prime Minister of India.

Just as we use 'the' before unique things, we use 'the' before unique persons also.

Exercise VI

I. Fill in the blanks with 'a', 'an' or 'the':

1. Can you count ____ starts in ____ sky?
2. Do you know how ____ earth was born?
3. ____ sun sets in the west.
4. ____ moon borrows light from ____ sun.

5. Who is ____ chief minister of Rajasthan?
6. He is ____ member of Parliament.
7. He is ____ member of the Legislative Assembly.

There are many members of any state assembly or parliament but there is only one Chief Minister of the State. So we use 'the' before Chief Minister or Prime Minster, and 'a' before member of Parliament or member of assembly.

II. Rewrite the sentences, if wrong with correct words. Put a(✓) if sentence is right.

a) A sky is blue ____.
b) Mrs.Indira Gandhi was a Prime Minister of India ____.
c) The shape of the earth is like that of an orange ____.
d) Let us write to a Chief Minister of Orrisa for giving us an all-weather road for the village ____.

It is clear that 'the' is used before 'unique things' or persons. Generally we do not use 'the' before the names of persons or places. But 'the' is used before the names of rivers, seas, oceans, groups of islands, mountans, etc. It is clear from the following examples:

(1) The Gopal is a good Boy.
(2) The Calcutta is a big city.

We should not use 'the' before Gopal or Calcutta so these two sentences are not correct.

(a) Akbar was a great ruler.
(b) Bombay is a costly city.

These sentences are correct.

(a) The Mahanadi is a great river.
(b) The Bay of Bengal washes the shores of Orrisa.

Here also, 'the' Has used correctly because Mahanadi is a name of river and Bay of Bengal is an ocean.

Exercise VII

I. Fill in the blanks where 'the' is necessary. Put a (x) if 'the' is not needed):

(a) _____ Delhi is _____ Capital of India.

(b) _____ Bhubaneswar is _____ capital of Orissa.

(c) He lives in _____ Jaipur.

(d) Have you read _____ poems of _____ Jaishankar Prasad?

(e) _____ Orissa owes a lot to Gopalbandhu.

II. Write the following sentences by using 'the'. If sentence is correct, put a tick (✓).

(a) Ganga is a holy river. ____

(b) Himalayas are to the north of India. ____

(c) London is on Thames. ____

(d) Andamans belong to India. ____

(e) Puri is on Bay of Bengal. ____

(f) Shakespeare was a great poet. ____

ANSWER KEY

CHECK YOUR ANSWERS

Exercise-I

1. Countable nouns are bird, man, temple, school.
2. a, b, f.

Exercise-II

1. C - Mango, pen, book, bird, chair, foreigner, man.
   U - Milk, ink, butter, oil, sleep.
2. (a) Countable, (b) uncountable, (c) countable, (d) countable, (e) articles (f) unknown or i ndefinite.

Exercise-III

1. A, A, 2. A, X, 3. A,X,X, 4. An, A, 5. X, 6. A, 7.X, 8. A, 9. A,X,X, 10. An, X.

Exercise-IV

I. (1) the, (2), the, (3), the, (4) the, (5) A, (6) A, (7) the, (8) A, the, (9) the, (10) A, (11) the, A, (12) an, (13) A, (14) An, A.

II. (the, X, (2) the, (3) A (4) X (5) the (6) A, the

Exercise-V

I. (i) A, (ii) the, (iii) An, (iv) the, (v) A, (vi) the

II. (a) Articles, (b) definite, indefinite, (c) A, A, A, the, the, the, the, A, the, the.

III. (a) A, A, the, A, (b) The, The, A, (c) X, (d) X, The, (e) The (f) The (g) The, The, (h) The.

Exercise-VI

I. (1) The, the, (2) the, (3) the, (4) the, the, (5) the, (6) A, (7) A.

II. (a) The sky, (b) the Prime Minister.

Exercise-VII

I. (a) X, the (b) X, the (c) X (d) The, X, (e) X, X.

II. (a) The Ganga, (b) The Himalayas, (c) The Thames, (d) The Andamans, (e) ✓ (f) On the Bay of Bengal.

LINEAR PROGRAMMED TEXT

The Definite Article

	1. We can **count certain things.** We say "one dog", "two dogs", "three dogs" and so on. "One", "two" "three" are **numbers to**.....things. * Write the missing word in the above sentence.
Answer to 1 count	2. We do not say : "One **milk**", "**two milks**", "three milks", etc. Milk is a thing which **we cannot**..... * Write the missing word in the above sentence.
Answer to 2 count	3. When we **count** things **we add numbers** to them. I have two pens. My sister has only one pen. In the above sentences "one" and "two" are..... ... ... to count a..... * Write the missing words in the above sentence.
Answer to 3	4. We **cannot count certain things.** We say "two pens", but we do not say "**two butters**", or "five teas". We do not add any.....to a thing which we cannot count. * Write the missing word in the above sentence.

Answer to 4 number	5. Books which we are able to **read** are known as **readable.** Scenes which we are able to **enjoy** are known as **enjoyable.** A thing which we are able to **bear** is called..... * Write the missing word in the above sentence.
Answer to 5 bearable	6. A thing which we can bear is **bearable.** Things which we can count are..... * Write the missing word in the above sentence.
Answer to 6 Countable	7. "Mango", "egg", "pen", "book" : these nouns are **countable** nouns because we can.....these things. * Write the missing word in the above sentence.
Answer to 7 count	8. "Milk", "butter", "ink", "oil", "gold", "iron" : these nouns are **uncountable** nouns because we cannot .....these things. * Write the missing word in the above sentence.

Answer to 8 count	9. A thing which is **countable** may be **one** or **many**. We can say "two boys", "three boys", or "many boys", because we can **count the number** of boys. "Boy" is a.....noun. * Write the missing word in the above sentence.
Answer to 9 countable	10. **Countable nouns** only can be described in **number** in the following way : **Singular** (one) — **Plural** (many) boy — boys girl — girls egg — eggs chair — chairs "Table" is a **countable** noun; so it has its..... form as "tables". * Write the missing word in the above sentence.
Answer to 10 plural	11. **Unconutable nouns do not have any plural.** We say "many mangoes", but we do not say "many milks". The noun "milk" has no plural because it is an..... noun. * Write the missing word in the above sentence.

Answer to 11 uncountable	12. **Singular** (one) — **Plural** (many) a. book — books b. fish — fishes c. ink — inks d. ice — ices e. butter — butters f. shop — shops * Tick (√) the correct plural forms.
Answer to 12 a, b, f.	13. Say which of the following words are countable. a. bird — e. temple b. sleep — f. school c. man — g. smoke d. dinner — h. mutton * Tick the right words.
Answea to 13 bird man temple school	14. "A" or "An" is used to mean one. For example, "A boy is crying in the lane". This sentence speaks about one boy who is unknown. Sheila wants an apple. a. Does she want more than one apple ? (Yes/No) b. Does she want any particular apple ? (Yes/No) * Tick the right word in the brackets.

Answer to 14 No No	15. "A" or "An" is used with nouns in the **singular** (one) number. Only c..... nouns have singular and plural. * Write the missing word in the above sentence.
Answer to 15 countable	16. Only **countable** nouns take "a" and "an". "Boy" is a countable noun; so we can say..... boy "in the sense of **one boy.** "Table" is a countable noun; so we can say "..... table" in the sense of..... table. * Write the missing words in the above sentence.
Answer to 16 a, a, one	17. "A" or "An" is used before a singular..... noun. It is never used before any..... noun. It is never used before any..... noun. * Write the missing words in the above sentences.
Answer to 17 countable plural uncountable	18. Remember : a. ONLY Countable Nouns take "a" or "an". b. ONLY Countable Nouns have plurals. c. "A", "An" and "The" : these words are known as "Articles". d. "A" or "An" is used to refer to any/one unknown person or thing.

19. A list of nouns is given here.

Write `C against countable nouns and U against uncountable nouns.

1. mango	7. butter
2. milk	8. chair
3. ink	9. oil
4. pen	10. foreigner
5. book	11. sleep
6. bird	12. man

20. Fill in the blanks.

Things we can count are known as..... .

Things we cannot count are known as..... .

21. ONLY.....nouns take "a" or "an".

(uncountable/countable)

ONLY.....nouns have plural forms.

(countable/uncountable)

* Tick the right word in the brackets.

22. a. Fill in the blanks.

"A", "An" and "The" : these words are called.....

..... .

(Nouns/Prqnouns/Articles)

b. "A" and "An" are.....articles.

(definite/indefinite)

* Tick the right word in the brackets.

	23. **Butter** is good for health. **Gold** is a precious metal. In the above sentences the underlined words are .....nouns. "A" or "An" is never used before.....nouns. * Write the missing words in the above sentences.
Answer to 23 uncountable uncountable	24. a. Please give me **a money.** b. Please give me **a rupee.** c. I don't take **a sugar.** d. I eat a cake Which of the above sentences are correct ? * Tick the right ones.
Answer to 24 b, d	25. "Sugar" is a thing which we.....count; we refer to its **quantity** like "five kilograms of sugar". But we.....count the number of cakes. * Supply the missing words.

Answer to 25 cannot can	25 A. Are you right if you say : (a) I usually take a milk in the morning. Yes/No (b) I do not take tea in the morning. Yes/No
Answer to 25 A. No Yes	26. Add "a" or "an", where necessary. Put a cross (X) where no article is needed. 1. .....handkerchief is made of..... piece of cloth. 2. ....window is made of .....glass. 3. .....ring is made of.....gold and .....silver. 4. .....orange grows on.....tree.
Answer to 26 1. a, a 2. a' x 3. a, x, x 4. an, a	27. Add "a" or "an", where necessary. Put a cross (X) where no article is used. 1. I drink.....milk in the morning. 2. I drink.....glass of milk in the morning. 3. Give me.....rice only. 4. Give me.....plate of rice only. 5. I want.....glass of.....coca cola with..... .....sugar in it. 6. I like to have.....orange instead of ....curd. 7. Do you take.....sugar in.....tea ?

Answer to 27

1. x
2. a
3. x
4. a
5. a, x. x
6. an, x
7. x, x

28. Compare the two **sentences.**

(a) There is **a horse in the garden.**

(b) **The horse** in the **garden** is white.

In the first sentence we speak about **"any single horse".**

In the second sentence we speak of **a particular horse** and not.....horse in general.

* Supply the missing word.

Answer to 28

any

29. (a) Do you want **a book** ?

(b) Take **the book** on the table.

In the first sentence the words "a book" **do not** refer to a particular or known book. But in the second sentence the words "the book" refer to a..... book which is on the table.

* Write the missing word.

Answer to 29

particular

30. Examine the three sentences.

(a) **A wolf** came to **a stream.**

(b) **A lamb** also came there.

(c) **A wolf** was stronger than **a lamb.**

The first two sentences are correct.

Is the third sentence also correct ?

(Yes/No)

* Tick the right word in the **brackets.**

Answer to 30 No	31. (a) A wolf and a lamb came to a stream. (b) **The wolf** was stronger than **the lamb.** In the second sentence we have used "the" before "wolf" and "lamb" because we speak about a particular wolf and a p.....lamb already mentioned in the first sentence. * Supply the missing word:
Answer to 31 particular	31 A. We do not use "the" before **any** wolf or **any** lamb. But before a.....wolf or lamb which has **already been mentioned** we use "....."
Answer to 31 A particular the	32. Add "a", "an" or "the", where necessary. 1. .....book on that shelf is an interesting one. 2. Let us go to.....club. 3. .....butcher opposite..... community hall sells good meat. 4. .....sun rises in the east. 5. .....student at the back of the class is doing sums. 6. She is.....charming girl. 7. I want to talk to.....boy of this class. 8. I want to talk to.....boy in the blue shirt. 9. He looks as stupid as .....owl.

Answer to 32
1. the
2. the
3. the, the
4. the
5. the
6. a
7. a
8. the
9. an

33. (a) A boy and a girl are going to the fair.

(b) **The girl is the boy's** sister.

We have used "the" before the words "boy" and "girl" because we are referring to a.....girl and a .....boy already mentioned in the first sentence.

* Supply the right words.

Answer to 33
particular
particular

34. You have already learnt that "a" or "an" is used with countable nouns to mean **any one** in general.

"The" is also used with countable nouns. But "the" is used to mean somebody or something..... and **not** anybody or anything in general.

* Supply the missing word.

Answer to 34
particular

35. We **count** the countable nouns in **number.**

We **measure** the uncountable nouns in q.....

Answer to 35
quantity

36. See that "a" is wrongly used in the following sentences.

1. **A milk** is good for health.
2. **A tea** is stimulating.

Indefinite article "a" or "an".....be used with uncountable nouns.

"Milk" and "tea" are.....nouns.

* Supply the missing words.

Answer to 36
cannot
uncountable

37. 1. **A glass of milk** every day is good for health.

2. **A cup of tea** after hard work is stimulating.

In the above sentences the **indefinite article** "a" is rightly used. Here we have used "a" with "glass" (tumbler) and "cup" which are **countables**. "Milk" and "tea" are.....nouns, but "cup" and "glass" are.....nouns. We can use..... before.....nouns only.

* Supply the missing words.

Answer to 37
uncountable
countable
"a" or "an"
countable

38. Add "a", "an" or "the" where necessary. Put a cross where no article is needed.

1. The heat of.....sun dries up..... water.
2. .....water in the tap is very hot.
3. I am thirsty. I want.....glass of water.
4. .....milk is good for health.
5. .....milk of a black cow is very sweet.
6. .....thirsty crow flew to a pitcher. But..... water in the pitcher was at a low level.

Answer to 38
1. the, x
2. the
3. a
4. x
5. the
6. a, the

39. Fill in the blanks with "a", "an" or "the", where necessary.

1. There is.....fly in.....tea.
2. Birds can fly in.....sky.
3. .....postman wears a cap.
4. .....postman has just put..... letter under..... ...door.

Answer to 39
1. a, the
2. the
3. a
4. the, a, the

39A. Fill in the blanks with "a", "an" or "the", where necessary.

1. .....umbrelra is useless against..... storm.
2. We reached there late in.....afternoon.
3. She is.....untidy girl.
4. Write an essay on.....street accident.
5. Tell him about.....accident that took place last evening.
6. Keep off.....grass while you are in the garden.

Answer to 39 A
1. an, a
2. the
3. an
4. a
5. the
6. the

40. Remember :

(a) "A", "An" are **indefinite articles.**

"The" is a **definite article.**

(b) "A" or "an" is used with **countable** nouns in **singular** number. **"A" or "an" is never used with uncountable nouns.**

(c) "The" is used with **both countable and uncountable** nouns; both in **singular** and **plural** of the countable nouns.

(d) We use "the" before a word in the sense of a **particular** person or thing.

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41. Add "a", "an" or "the", where necessary.

1. The sale of .....cake depends on its taste.
2. .....cake you are eating was made for the Chief Guest.

3. .....apple is very good to eat.

4. Eat.....apple your mother is giving; don't ask for any other.

5. Rahul wants.....story-book for the evening.

6. .....book he wants is out of print.

---

42. (a) The words "a", "an" and "the" are..... .

(b) "The" is a.....article while "a" and "an" are indefinite articles.

* Supply the missing words in the above sentences.

---

43. The definite article "the" is used when we speak of a person or thing **already referred** to or mentioned previously.

Add the correct word :

....man and.....boy were going along .....road. .....road was dusty. .....man was pushing.....boy along..... road on.....toy bicycle. ..... bicycle belonged to.....boy's sister.

44. Add "a/an" or "the", where necessary.

1. His sister is.....teacher.

   She is ill and needs treatment.

   He goes to.....doctor.

   .....doctor says it is.....hopeless case.

2. .....man who sits on.....donkey is

   .....fool.

Answer to 44
1. a, a, the, a
2. the, the, a

45. Add "the" where necessary. Put a cross where "the" is not needed.

1. I want.....grapes.
2. I love.....children. But.....children of this house are noisy.
3. Have you got.....book you wanted to buy ?
4. I have given him.....books he wanted.

Answer to 45
1. x
2. x, the
3. the
4. the

46. Add "the" where necessary. Put a cross where "the" is not used.

1. I want some butter on.....potatoes. Please pass.....butter over there.
2. .....mutton bought for today's feast is stale.

   Send for.....man.
3. If..... .....wishes were.....horses,.....

   beggars might ride.
4. You have to act according to .....wishes of your father.

Answer to 46
1. the, the
2. the, the
3. x, x, x
4. the

47. Now you have learnt that we can use the definite article "the"

(a) with countables singular and plural;

(b) with uncountables.

But "the" is used **to particularise the meaning of a noun or to make the meaning definite.**

"A" or "an" is used

(a) With.....nouns in.....number;

(b) Never with.....nouns;

(c) Never with nouns in.....number.

* Supply the missing words.

Answer to 47
(a) countable singular
(b) uncountable
(c) plural

48. Look at the following paragraph. "The" is wrongly used at some places. Put a cross where it is wrongly used.

The (1) lean dog was wandering in search of **The** (2) food. He met **the** (3) fat dog. **The** (4) lean dog made friends with **the** (5) fat dog. He asked **the** (6) fat dog, "How is it that you are so strong ?" **The** (7) fat dog said, "I work in my master's house and get good food".

Answer to 48
1. x
2. x
3. x

49. Fill in the blanks with "the", "a" or "an", as suitable.

1. .....lean dog was wandering in search of food.

2. He met.....fat dog.

	3. .....lean dog wondered at..... health of.. .....fat dog. 4. He asked.....fat dog, "How is it that you are so strong ?" 5. At that time.....wolf came that way. 6. Both.....lean dog and.....fat dog hid themselves behind.....big tree.
Answer to 49 1. A 2. a 3. The, the, the 4. the 5. a 6. the, the, a	50. Examine the use of "the" in the following sentences. **The sun** shines brightly. **The moon** did not rise till after ten. We have used.....before "sun" and "moon" because there is no second sun or moon in the sky. Before things which are **unique**(there is only one) we use..... * Supply the missing words.
Answer to 50 the the	50 A. Before **unique** things we use "the". The earth is a unique thing because there are no two earths. So we use.....before "earth".

Answer to 50 A
the

51. Fill in the blanks with "a/an" or "the".

1. Can you count..... stars in ..... sky ?
2. Do you know how..... earth was born ?
3. .. ..sun sets in the west.
4. .....moon borrows light from ....sun.

Answer to 51
1. the, the
2. the
3. the
4. the, the

52. Look at the sentences.

1. **The President will come to Bhubaneswar tomorrow.**
2. The **Prime Minister said this.**

In the above sentences we have used .. ..before "President" and "Prime Minister" to mean "the President of India" and "the Prime Minister of India".

Just as we use "the" before **unique** things, we use "the" before.. ....persons also.

Answer to 52
the
unique

53. Look at the sentence.

The Chief Minister will distribute the prizes.

There should be "A" in place of "The" before "Chief Minister".

* Right or wrong ?

Answer to 53 wrong	53 A. Fill in the blanks. 1. Who is.....Chief Miniter of Rajasthan ? 2. He is.....Member of the Parliament. 3. He is.....Member of the Legislative Assembly.
Answer to 53 A the a	53 B. There are many members of any State Assembly or the Parliament. But we have always one (only one) Chief Minister or Prime Minister. That is why we use.....before "Chief Minister" or "Prime Minister"; and.....before "Member of the Parliament" "or Member of the Assembly".
Answer to 53 B the	54. Rewrite the sentences, if wrong, with correct words. Put a tick if a sentence is right. 1. A sky is blue. ..... 2. Mrs. Indira Gandhi is a Prime Minister of India. ..... 3. The shape of the earth is like that of an orange. ..... 4. Let us write to a Chief Minister of Orissa for giving us an all-weather road for the village. ..... * Write your answer in the blank space.

Answer to 54 1. The Sky 2. the Prime Minister 3. √ 4. the Chief Minister.	55. Now you have learnt that we use "the" before u..... persons or things. *. Supply the missing word.
Answer to 55 unique	56. This is **not correct** to say : **The Gopal** is a good boy. **The Calcutta** is a big city. We do **not** use **"the"** before **names of persons or places.** "Calcutta" is the name of a place (town); so we should.....use.....before "Calcutta". * Supply the missing words.
Answer to 56 not "the"	57. Examine these sentences : **Akbar** was a great ruler. **Rabindranath** was a great poet. **Bombay** is a costly city. We should use "the" before **Akbar,** **Rabindranath** and **Bombay.** * Right or wrong ?
Answer to 57 wrong	58. Fill in the blanks with "the", where necessary. Put a cross if "the" is not needed. 1. .....Delhi is .....capital of India. 2. .....Bhubaneswar is..... capital of Orissa.

3. He lives in..... .....Jaipur.

4. Have you read.....poems of.....

Jai Shankar Prasad ?

5. .....Orissa owes a lot to.....

Gopabandhu.

Answer to 58
1. x, the
2. x, the
3. x
4. the, x
5. x, x

59. (a) Normally "the" is.....used before the names of persons and places.

(b) But "the" is used before the names of **rivers, seas, oceans, groups of islands, mountain ranges,** etc.

Example : **The Mahanadi** is a big river.

Mahanadi is the name of a.....; so we use... ..... before "Mahandi".

* Supply the missing words.

Answer to 59
a) not
b) river, "the"

60. (a) "Indian Ocean" is the name of an ocean.

We use.....before names of oceans.

(b) Is the following sentence correct ?

The Bay of Bengal washes the shores of Orissa.

Yes/No

* Supply the missing word in (a). Tick the correct word in (b).

Answer to 60
(a) "the"
(b) Yes

~~61~~. Add "the" where necessary. Put a tick where th sentence is correct. Write your answer in the spac provided under each sentence.

1. Ganga is a holy river.

   .....

2. Himalayas are to the north of India.

   .....

3. Shakespeare was a great poet.

   .....

4. London is on Thames.

   .....

5. Andamans belong to India.

   .....

6. Puri is on Bay of Bengal.

   .....

Answer to ~~61~~

1. The Ganga
2. The Himalayas
3. √
4. on the Thames
5. The Andamans
6. on the Bay of Bengal